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Transatlantic Defence Industrial Relationships: An Audit and Commentary

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THE UNIVERSITY
of MANCHESTER

PREST

POLICY RESEARCH IN
ENGINEERING, SCIENCE & TECHNOLOGY

REPORT

Transatlantic defence industrial relationships: an audit and commentary

A study for
CNA Corporation

Andrew James
John Rigby

July 2001

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27 December 2001

Captain Ernest Anastos
Deputy DASN (Planning, Programming and Resources)
Pentagon 5E785
Washington, DC 20350-1000

Dear Captain Anastos:

Ref: CNA Project No. 03-042-1883100 (Delivery Order No. 0008)

Enclosure: *Transatlantic Defence Industrial Relationships: An Audit and Commentary*, by Andrew James and John Rigby

During a meeting last year, Mr. Schaefer expressed interest in the participation of major U.S. defense contractors in the European defense market, in terms of their:

- Current and potential future foreign military sales
- Defense-related strategic alliances, joint ventures, and acquisitions or divestments involving European firms.

In addition, Mr. Schaefer asked for a study of two European companied (BAE Systems and Rolls-Royce), in terms of their:

- Corporate organization and strategy
- Recent defense-related acquisitions or divestments
- Current and potential future participation in U.S. defense programs
- Strategic alliances and joint ventures involving U.S. firms.

In order to satisfy Mr. Schaefer's interests in these areas, CNA hired a noted British expert, Mr. Andrew James of the University of Manchester. I have enclosed two copies of Mr. James' report, and I am available to discuss his findings at your convenience.

Matthew S. Goldberg, Director
Cost and Acquisition Team
Resource Analysis Division

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Executive Summary

In August 2000, PREST (Policy Research in Engineering, Science & Technology), a research institute of the University of Manchester in the United Kingdom was asked by CNA Corporation of Alexandria, Virginia to undertake a study of the participation of ten leading US defence contractors in the European defence market. PREST was also asked to profile two leading European defence contractors – BAE Systems and Rolls-Royce – and analyse their participation in the US defence market. The study was set against a background of growing interest amongst policy makers and defence industry executives about the scope for a transatlantic dimension to defence industrial restructuring.

For each US company the report describes and analyses the company's participation in the European defence market in terms of its current and potential future foreign military sales and its defence-related strategic alliances, joint ventures and acquisitions/divestments involving European firms. The report finds that the companies have differing exposure to the European market as a consequence of their corporate strategies, the types of systems they produce and the extent of European capabilities in those fields.

The report also shows that the participation of US companies in the European defence market has evolved over the last fifty years from predominantly government-led arrangements driven by Cold War concerns about Western European military capabilities towards increasingly industry-led relationships driven by commercial concerns about market access. At the same time, there is a growing recognition amongst US companies that they need to do more than offer offsets if they are to secure European contracts in the future. US companies that are seeking to expand their position in Europe are increasingly pursuing strategies that involve teaming arrangements and consortia with European companies and they are supporting these strategies with a growing footprint of European strategic alliances, joint ventures and wholly-owned subsidiaries. In this way they are seeking to address growing European demands for greater technology transfer and industrial participation in transatlantic procurement programmes.

The report also profiles BAE Systems and Rolls-Royce, describing and analysing their corporate organisation, corporate strategy, recent defence-related acquisitions/divestments, current and potential future participation in US defence programmes, strategic alliances and joint ventures involving US firms, their wholly-owned subsidiaries in the US and their corporate financial performance. The report emphasises the position of BAE Systems and Rolls Royce in the US defence market. Through direct sales – but particularly through acquisition - both companies have established very significant positions as contractors to the US Department of Defense and suppliers of highly sensitive and technologically advanced defence systems.

Looking to the future, the report makes clear that companies in the newly consolidated European defence industry and their US counterparts will face significant and on-going business pressures to expand their international activities, and transatlantic relationships are likely to be an important dimension of their strategies. As part of this, non-UK European companies will be increasingly active in seeking to enter the US defence market through acquisition and joint venture. Amongst these Thales and EADS are likely to play a prominent role.

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Contents

Glossary of terms used in the report

Key to abbreviations used in supporting tables

A classification of types of programme are used in the supporting tables in this document as follows:

- A=artillery
- Ac=aircraft
- El=electronics
- Eng=engines
- Hel=helicopter
- Mi=missiles
- MV=military vehicles
- SA/O=small arms/ordnance
- Sh=ships
- Oth=other

Programme typology

This report also divides programmes in terms of the type of international collaboration involved as follows[1]:

- *FMS* – government-to-government sales under the US Foreign Military Sales programme
- *Commercial sale* – direct sale by company to a government customer or as a supplier to another company
- *Licensed production* – assembly under license of the parts and components of a weapon system supplied by another country.
- *Co-production* – joint production of a part, component or weapon system by firms of different nations.
- *Co-development* – joint development (research, design and/or engineering) of a part, component or weapon system by firms of different nations.
- *Teaming* – an agreement among firms to collaborate to meet the requirements of a particular programme.
- *Off-set* – counter-trade related to the sale of a weapons system to a foreign customer.

Definition of corporate relationships

The report also makes reference to a range of corporate relationships used in transatlantic defence industry relationships and these are defined as follows:

- *Strategic alliance* – a formal statement of intent between two or more business entities to work together in a particular business area that may well be articulated through a Memorandum of Understanding (MoU).
- *Joint venture* – a corporate entity jointly owned by two or more companies to pursue the development and/or production of a particular military technology or weapon system or to pursue business opportunities in a particular market segment.
- *Wholly-owned subsidiary* – a foreign business unit owned and controlled by a single corporate parent.

[1] These definitions are adapted from William W. Keller, *Arm in Arm – The Political Economy of the Global Arms Trade* (New York: Basic Books, 1995).

Transatlantic Defence Industrial Relationships: An Audit and Commentary

1. Introduction

In August 2000, PREST (Policy Research in Engineering, Science & Technology), a research institute of the University of Manchester in the United Kingdom was asked by CNA Corporation of Alexandria, Virginia to undertake a study of the participation in the European defence market of ten leading US defence contractors. PREST was also asked to profile two leading European defence contractors – BAE Systems and Rolls-Royce – and study their participation in the US defence market.

1.1 Context

This study is set against a background of growing interest in the scope for a transatlantic dimension to defence industrial restructuring. In particular:

- Growing efforts by US and European defence manufacturers to increase exports as a means of increasing revenues and recouping development costs.
- Growing concerns amongst policy makers that defence industry restructuring might lead to a "Fortress Europe" facing a "Fortress America".
- Policy initiatives by the last Clinton administration to encourage transatlantic mergers and acquisitions and joint ventures and the launch of the Defense Trade Security Initiative (DTSI) to amend the regulatory context for US arms exports to allies in Europe and the Pacific.
- A number of merger and acquisition and joint venture transactions that have led to the acquisition of US defence businesses by European companies.

1.2 Purpose of the study

The objective of this study is as follows:

- For ten US defence firms identified by CNA Corporation, describe and analyse their participation in the European defence market in terms of their current and potential future foreign military sales and their defence-related strategic alliances, joint ventures and acquisitions/divestments involving European firms.
- For two European companies (BAE Systems and Rolls-Royce) identified by CNA Corporation, describe and analyse their corporate organisation, corporate strategy, recent defence-related acquisitions/divestments, current and potential future participation in US defence programmes, strategic alliances and joint ventures involving US firms, their wholly-owned subsidiaries in the US and their corporate financial performance.

1.3 Research approach

To address these questions PREST employed the following research approach:

Companies studied

The ten US companies studied were selected by CNA Corporation as follows: Boeing, Lockheed Martin, General Dynamics, Raytheon, Litton Industries, Northrop Grumman, Textron, General Electric, Newport News Shipbuilding and United Technologies. Litton Industries-Northrop Grumman and General Dynamics-Newport News Shipbuilding are treated as separate entities although they announced merger

plans during the course of the study. CNA Corporation also selected two European companies for study - BAE Systems and Rolls-Royce. Both have their corporate headquarters in the United Kingdom.

Countries studied

For the purposes of this study, "Europe" was defined as the western European members of NATO (Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Norway, Spain, United Kingdom) plus Sweden (which has some important relationships with the US defence industrial base).

Data collected

In support of the study objectives, data was collected through a detailed review of publicly available secondary sources. These included certain aerospace/defence databases as well as aerospace and defence industry publications (*Aviation Week & Space Technology*, *Defense News*, *Jane's Defence Weekly*, etc), financial newspapers (*Financial Times*, *Wall Street Journal*, *Les Echos*, etc.) and publications and reports by think tanks, government agencies, national governments as well as academic authorities. In addition, we undertook a detailed analysis of company Annual Reports & Accounts as well as company web sites. The data collected was complemented by PREST's established knowledge in the subject area and – in particular – a series of studies undertaken by Andrew James during the period 1998-2000[2].

Limitations of the data collected

It ought to be emphasised that the data on defence programmes contained in this report does not purport to be a complete listing of all programmes in which the study companies may have an interest but it is intended to capture all of the significant interests of the companies studied. The objective has been to identify key programmes and illustrate the types of programmes in which the companies are engaged. The data primarily focuses on programmes for which there were orders or deliveries during the period 1998-200 although – in some cases – notable programme wins during 2001 are included. The data focuses on company participation as prime contractor or supplier of major sub-systems and thus may well not capture company participation on programmes at lower levels of the supply chain. In general, orders and deliveries of less than $10 million are excluded. An exchange rate of £ = $1.45 is used throughout the report.

[2] Andrew D. James *Post-Merger Strategies of the Leading US Defence Aerospace Companies*, FIND Programme User Report (Stockholm: FOA Defence Research Establishment, 1998); Andrew D. James *Medium Sized Defence Electronics Companies and US Defence Industry Restructuring*, FIND Programme User Report (Stockholm: FOA Defence Research Establishment, 2000); Andrew D. James and Mattias Axelson *The Defence Industry and Globalisation – Challenging Traditional Structures*, FIND Programme User Report (Stockholm: FOA Defence Research Establishment, 2001); Andrew D. James "The prospects for a transatlantic defence industry" in Schmitt, B (ed). *Between Cooperation and Competition: the Transatlantic Defence Market*, Chaillot Paper 42 (Paris: Institute for Security Studies Western European Union, 2001).

2. The evolution of transatlantic defence industrial relationships

The last fifty years have seen the evolution of transatlantic defence industrial relationships from predominantly government-led arrangements driven by Cold War concerns about Western European military capabilities towards increasingly industry-led relationships driven by commercial concerns about market access.

2.1 Government-led programmes

Transatlantic defence industrial relationships have a long history. In the first decades after the end of the Second World War, the United States maintained an almost unchallenged position in advanced military technology and industry. Europe was struggling to re-build its war-torn economy, most of its military industry was exhausted or destroyed and the former Axis powers were prohibited by treaty from rebuilding an independent defence industrial base. In response, the United States gave or sold military equipment to its allies in Europe to support the NATO Alliance and maintain a coordinated conventional deterrent against the threat of Warsaw Pact invasion of Western Europe.[3] Thus, the 1950s and 1960s saw the United States license the production of a number of weapons systems to Europe. These included the F-104 fighter to Belgium, Germany, Italy and the Netherlands, the F-4 fighter to the United Kingdom, the M-60 tank to Italy and the *Sidewinder* and *Hawk* missiles to a number of European NATO countries.[4]

The 1970s saw the emergence of new forms of transatlantic collaboration in response to growing NATO concerns about the standardisation, rationalisation and interoperability of defence equipment and a desire on the part of European countries to create more of a 'two-way street' in the transatlantic relationship. Thus, under a co-production agreement, the US-developed F-16 fighter aircraft was produced in two European countries (Belgium and the Netherlands) for a number of European partner countries that initially included Denmark and Norway and later also Greece and Turkey. These partners were guaranteed a work share in sub-assemblies for the entire European and US production.[5] The next three decades also saw a series of other government-to-government initiatives to promote arms cooperation within NATO, all of which were to meet with rather limited success and often-conspicuous failure. The 'family of weapons' concept emerged, under which a group of NATO countries would develop and produce a range of similar weapons systems. In 1978, NATO agreed that the United States would lead the development of one family member (AMRAAM) and the Europeans would lead the development of another (ASRAAM). Both sides were to buy the equipment from each other but the programmes were to eventually collapse as a result of cost overruns and programme delays.[6]

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[3] Jeffrey Becker, 'The future of Atlantic defense procurement', *Defense Analysis*, vol. 16, no. 1, 2000, pp. 9-32. William W. Keller, op cit in note 1.

[4] Richard A. Bitzinger, 'The globalization of the arms industry', *International Security*, vol. 19, no. 2, Fall 1994, pp. 170-98; Elisabeth Sköns 'Western Europe: internationalization of the arms industry' in H. Wulf ed., *Arms Industry Limited* (Oxford: Oxford University Press for SIPRI, 1993).

[5] Idem.

[6] Trevor Taylor, 'Transatlanticism versus regional consolidation', in David G. Haglund and S. Neil MacFarlane (eds.), *Security, Strategy and the Global Economics of Defence Production* (Montreal

Similarly, in the late 1980s, the US government engaged in a number of government-to-government joint weapons development programmes with NATO European allies. Several of these so-called 'Nunn amendment' programmes were abandoned at an early stage, including the NATO Frigate Replacement (NFR90), the Autonomous Precision-Guided Munitions (APGM) programme and the Modular Stand-Off Weapon (MSOW). Their failure reflected the difficulty of harmonising military requirements, as well as limited political commitment on the part of the governments involved in the programmes.[7]

Undaunted by this troubled history, the Clinton administration also gave high-level political support to the goal of NATO armaments cooperation, not least through cooperative initiatives on three particular programmes. The US Joint Strike Fighter (JSF) programme was the largest and most significant programme that the United States opened to cooperative development with participation by Canada, Denmark, the Netherlands, Norway and the United Kingdom. The United States also entered the Multifunction Information Distribution Systems (MIDS) programme – a digital-information-distribution system to provide integrated battlefield communications, navigation and identification – with European participation by France, Germany, Italy and Spain.[8] The Medium Extended Air Defence System (MEADS) was the other government-to-government programme launched under the first-term of the Clinton administration, and the disputes and disagreements between the US and Germany over technology transfer and security highlight some of the challenges that have so often dogged these types of transatlantic industrial relationships.

2.2 Growing industry-led collaboration

Whilst government-to-government relationships have been dogged by problems, industry-to-industry collaborative arrangements became increasingly common in the 1990s. Thus, a number of transatlantic strategic alliances have been established over the last decade. For example, General Dynamics Corp. and the then British Aerospace entered into a relationship in the early 1990s to explore cooperation on armoured vehicles.[9] The US-Italian Lockheed Martin-Alenia Tactical Transport Systems joint venture was established to develop the C-27J medium transport aircraft[10] and – in April 2000 – DASA/EADS and Northrop Grumman signed a memorandum of understanding to explore opportunities in the defence market.[11] At the same time, European acquisitions of US defence companies grew in number. Between 1988 and 1992, according to one estimate, sixty US defence companies were sold – mostly to European companies – for some $10 billion. These included the 1988 acquisition of Singer Electronic Systems division by Plessey of the United Kingdom, the 1989 sale of Fairchild Space & Defense to Matra of France and the Aerospatiale-Alcatel-Alenia

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& Kingston: McGill-Queen's University Press, 1999). Also see Richard A. Bitzinger op. cit. in note 4.

7 William W. Keller, op. cit. in note 1.

8 Robert P. Grant 'Transatlantic armament relations under strain', *Survival*, vol. 39, no. 1, 1997, pp. 111-37.

9 See Richard A. Bitzinger; Elisabeth Sköns, op. cit. in note 4.

10 Pierre Sparaco, 'US, Europe explore transatlantic partnerships', *Aviation Week & Space Technology*, 13 September 1999, pp. 37-8.

11 John D. Morrocco, 'EADS, Northrop Grumman broaden cooperative links', *Aviation Week & Space Technology*, 12 June 2000, pp. 35-6.

acquisition of a 49 per cent stake in Ford Aerospace's Space Systems division in 1990.[12]

However, the development of such transatlantic relationships has not always been without controversy, as the French company Thomson was to find when it sought to acquire the Missiles Division of the LTV Aerospace and Defense Company in the early 1990s. Thomson – in a consortium with the Hughes Aircraft Company – successfully outbid Martin Marietta and Lockheed to take control of the US missile house only to see the deal become the object of a concerted lobbying campaign in Congress by Martin Marietta and others. Congressional hearings followed and opposition from leading US politicians eventually caused Thomson to decide withdraw its bid.[13] The LTV Missile debacle may have been an unusually public case but it does serve to emphasise the political sensitivities that can be stirred up by foreign participation in a country's defence industrial base – especially where it threatens the business interests of powerful domestic rivals.

Certainly, the experience soured Franco-US relations and only served to heighten French suspicions about 'Fortress America'. However, it did not put an end to European acquisition activity in the United States, and the 1990s were to see UK companies in particular take control of a number of important and sensitive US defence industrial assets. Thus, in 1994, UK company Rolls-Royce acquired Allison Engine Company – a major manufacturer of military aircraft engines. More significant still was the US government's decision in 1998 to allow GEC Marconi to acquire the defence electronics company Tracor. Many industry observers saw this at the time as a path-breaking acquisition, not least because of the nature of many of the technologies developed by Tracor and the role of the company in a number of highly sensitive US government programmes in the defence and intelligence fields.

In addition, other modes of transatlantic industrial cooperation became increasingly important during the 1990s, not least the continued growth of the transatlantic sourcing of subsystems and components by prime contractors.[14] The transatlantic market in this area was estimated to be worth over $11 billion in 1997, with European sales of components and subsystems to the United States worth $6.1 billion.[15] Offset arrangements associated with major US equipment sales accounted for an important share of this figure and – according to one estimate – European components represented some 10 per cent of the value of F-16 aircraft bought by the United States Air Force.[16] US components and subsystems also play an important part in European systems. Thus, Litton Industries estimates that each *Eurofighter* aircraft contains Litton avionics worth $1 million supplied from either direct transatlantic sales or Litton's European subsidiaries.[17] Similarly, Sweden's JAS-39 *Gripen* fighter aircraft depends on more than a dozen foreign suppliers of key subsystems and components, including US companies UTC Sundstrand, Honeywell and General Electric.[18]

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12 Figures cited in William W. Keller, op. cit. in note 1.

13 Idem.

14 Andrew D. James, op cit in note 2.

15 International Institute for Strategic Studies, *The Military Balance 1998/99* (Oxford: Oxford University Press for The International Institute for Strategic Studies, 1999).

16 William W. Keller, op. cit. in note 3.

17 Andrew D. James op. cit. in note 1.

18 Maria Andersson and Johan Lilliecreutz, *Supply Chain Strategies and Sub-Tier Structures*, FOA User Report, FOA Defence Research Establishment, Stockholm, March 2000.

2.3 Business pressures for closer transatlantic relationships

What is clear is that the companies in the newly consolidated European defence industry and their US counterparts face significant business pressures to expand their international activities, and transatlantic relationships are likely to be an important dimension of their strategies.

Limited defence spending

Both US and European defence companies are facing growing pressures to internationalise their activities, not least because their home markets do not offer sufficient prospects to sustain them in the future. Since the end of the Cold War, European countries have made considerable cuts in their defence budgets. Between 1989 and 1998, France, Germany and the United Kingdom – which together accounted for 58 per cent of the Western European total in 1998 – reduced their defence expenditure by 12, 28 and 24 per cent respectively.[19] Even sustaining defence budgets at their reduced levels is likely to represent a political challenge for the majority of NATO European governments, especially as they seek to meet the Maastricht Treaty criteria for government debt. At the same time, many governments are faced with the management of competing priorities such as the professionalisation of their armed forces and equipment modernisation within static or shrinking defence budgets.[20] Certainly, there is little sign that any European country shares the US intention to increase defence spending (particularly on procurement) during the next five years. Indeed, even in the United States – where the Clinton administration's budget for 2000 contained the first sustained and long-term increase in US defence spending since the end of the Cold War – companies will continue to struggle to meet the financial expectations of their investors. The end of merger-driven opportunities for expansion has left US defence contractors struggling to raise growth rates in their defence businesses, and Wall Street remains sceptical about their ability to utilise defence-related technologies to diversify into civil markets. Thus, US companies are increasingly seeking new defence contracts by expanding their international presence.[21]

Cost and risk sharing

At the same time, companies are increasingly looking to share the costs and risks of new programmes in the face of the growing cost and technological complexity of designing and developing advanced weapons systems.[22] In practical terms, these pressures mean that it is increasingly difficult for any single company – whether in the United States or Europe – to find the investment funds and technological capabilities needed to develop such programmes alone. Thus, internationalisation is also being driven by a desire on the part of even the largest US contractors to share programme costs, access specific non-US technologies and seek new sources of capital. For European companies, transatlantic industrial relationships promise opportunities to

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19 Stockholm International Peace Research Institute, *SIPRI Yearbook 1999* (Oxford: Oxford University Press for SIPRI, 1999).

20 International Institute for Strategic Studies, op. cit. in note 15; Douglas Barrie, 'Defense budgets remain tight throughout Europe', *Defense News*, 20 December 1999, p. 26; 'The European way of defence', *The Economist*, 24 June 2000, p. 23.

21 See Andrew D. James, op. cit. in note 2.

22 See 'Linking Arms: A Survey of the Global Defence Industry', *The Economist*, 14 June 1997, and Burkard Schmitt, *From Cooperation to Integration: Defence and Aerospace Industries in Europe*, Chaillot Paper 40 (Paris: Western European Union Institute for Security Studies, July 2000)

access US technology that will enable them to meet European programme requirements.

Access to markets and programmes

Above all, budget trends mean that – for the foreseeable future – there will be few new weapons programmes, and existing programmes face the prospect of being scaled-down or even cancelled. Thus, the challenge for defence companies is to ensure that they are able to participate in as many new programmes as possible and that they reduce their dependence on any one particular contract or national government customer. This emphasises the importance to companies of having a presence in both the US and European markets, and of capturing an increasing share of markets elsewhere in the world. Accordingly, defence firms in both the United States and Europe have aggressively pursued arms exports as a way of making up for some of the post-Cold War decline in their home markets, and this has brought US and European companies into often intense and sometimes acrimonious head-to-head competition in third countries.[23]

Nevertheless, the size of the US and European markets is such that it is inevitable that they are becoming the focus for new transatlantic business strategies, and the nature of the defence market means that the leading companies appear to be concluding that a local presence is vital if they wish to participate in major foreign programmes. The extent to which this is becoming the case for the US Navy's ten largest contractors – and the strategies that they are adopting with regard to the European market – is the central focus of this study.

3. US participation in the European defence market

The previous section emphasised that US defence contractors have long had access to European markets through a combination of government-to-government programmes, licensing and Foreign Military Sales. However, in the face of increasing European demands for greater technology transfer and industrial participation in major procurement programmes there appears to be a growing recognition amongst US companies that they need to do more than offer offsets if they are to secure European contracts in the future. Thus, building strong European programme teams, supported by significant technology transfer from the United States, is seen as increasingly important by US companies seeking to participate in European programmes.[24]

3.1 Differing exposure to the European market

US defence companies have differing exposure to the European market as a consequence of the types of systems they produce, the extent of European capabilities in those fields and the corporate strategies that they have pursued. The ten companies can be categorised into four types according to the extent of their participation in European programmes and the extent of their European "footprint" of strategic alliances, joint ventures and wholly-owned subsidiaries.

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[23] Jens Van Scherpenberg, 'Transatlantic competition and European defence industries: a new look at the trade-defence linkage', *International Affairs*, vol. 73, no. 1, 1997, pp. 99-122.

[24] See Andrew D. James, op. cit. in note 2. Raytheon's bid strategies for the UK ASTOR and BVRAAM programmes are good illustrations of these new strategies.

US-centric companies

At one extreme is Newport News Shipbuilding. The company's defence-related business activities are almost entirely focused on the US market and – in particular – the requirements of the US Navy. The company does not participate in European programmes nor does it have any European strategic alliances, joint ventures or wholly-owned subsidiaries.

Export-focused companies

A second group of companies can be seen to be pursuing a traditional US approach to the European defence market. Thus, participation in the European market is principally based on Foreign Military Sales and these may be accompanied by off set deals and – in some cases – licensed production by European companies. Boeing, Textron and United Technologies (particularly Sikorsky) can be characterised as export-focused companies although – as this study will go on to note – Boeing's strategy is evolving towards a more international approach to its defence business.

Emerging transatlantic companies

A third group of companies can be seen to be pursuing a rather different approach. These companies have relatively extensive participation in the European defence market that extends beyond FMS to teaming arrangements and consortia with European companies and is supported by a sizeable footprint of European strategic alliances, joint ventures and wholly-owned subsidiaries. Lockheed Martin, Raytheon, Litton Industries and General Electric can be characterised as emerging transatlantic companies.

Aspiring transatlantic companies

A final group can be seen to be aspiring to increase their presence in the European market beyond that provided by Foreign Military Sales. These companies have entered into strategic alliances and joint ventures and have – in some cases – acquired European defence-related business. However, the extent of their participation in the European market remains rather less than that of the emerging transatlantic companies. General Dynamics, Northrop Grumman, Pratt & Whitney and Boeing can be argued to fall into this category..

3.2 Emerging transatlantic alliances

An analysis of the strategies of the companies suggests an emerging pattern of alliances between leading US and European companies:

- *Boeing-BAE Systems* – building on BAE Systems' long-standing relationship with McDonnell Douglas, this study will go on to note that Boeing and BAE Systems appear to deepening that relationship through a number of formal and informal alliances across a range of activities.
- *Lockheed Martin-EADS* – Aerospatiale-Matra (a partner in EADS) and Lockheed Martin have long discussed collaborative relationships on mission aircraft and this report will go on to note that there is some evidence that this relationship is growing.
- *Raytheon-Thales* – the announcement in 2000 of the planned creation of Thales Raytheon Systems Co. – a joint venture in air defence, command and control and ground-based radar - represents a major development in US-

French defence industrial relationships and an extension of long-standing relationships between the two companies.

- *Northrop Grumman-EADS* – Northrop Grumman has established a number of relationships with EADS.

3.3 Potential future programmes

The study identifies a number of potential future programmes that present opportunities for US companies and/or transatlantic defence industrial collaboration. These programmes include:

- *Joint Strike Fighter* – the scale of the JSF programme and the formal participation of the United Kingdom as a full development partner, Denmark, the Netherlands and Norway as associated partners and Italy as an informal partner – means that it represents by far the largest potential transatlantic programme.
- *Bowman* – the decision of the UK government to re-compete this military communications system project presents a significant opportunity for certain US companies, not least General Dynamics.
- *TRACER/Future Scout Cavalry System* – this programme represents a significant opportunity for US-UK collaboration in the military vehicle segment although changes in US Army requirements mean that there is some uncertainty as to whether it will reach the full production stage.
- *NATO Theatre Ballistic Missile Defence (TBMD)* – this forthcoming requirement has already been the focus of considerable US-European teaming activity in preparation for the letting of feasibility studies during 2001.
- *NATO Alliance Growth Surveillance project (AGS)* – where there is growing pressures within NATO to merge competing European and US efforts in the area.

4. Boeing

Since its merger with McDonnell Douglas, Boeing has placed considerable emphasis on the importance of international collaboration in its strategy for its military aircraft and missiles business. In this, Boeing is seeking to build on McDonnell Douglas' established international partnerships. Boeing has talked about "global strategies" driven by the recognition that without collaboration the company will not have access to all the technology necessary for its products to stay at the leading edge and the fact that it is no longer possible for US companies to rely solely on domestic markets if they are to prosper.[25] In support of this strategy, Boeing has been reported as actively seeking to establish a presence in Europe and Asia, and is said to be evaluating joint venture and acquisition opportunities in key markets.[26] Indeed, the company's strong balance sheet and healthy cash flow means that it may have more strategic options open to it than Raytheon or Lockheed Martin.

[25] 'The future of aerospace defense manufacturing: collaboration ot competition', presentation by Michael Sears, President, Military Aircraft and Missile Systems group, The Boeing Company, to World Aerospace and Air Transport Conference, 4 September 1998.

[26] See John D. Morrocco, 'Boeing looks to boost global presence', *Aviation Week & Space Technology*, 3 April 2000.

Such developments start from a relatively small base. Historically, Boeing's defence business tended to focus almost exclusively on the US market and - for a company of its size - Boeing has a surprisingly small footprint in Europe. The company has made a number of large European sales through FMS and licensed production. However, it has little in the way of European joint ventures and wholly-owned subsidiaries. Boeing's membership of the European *Meteor* consortium that is developing a Beyond Visual Range Air-to-Air Missile (BVRAAM) to meet future European requirements ought to be emphasised as a potentially important development for the company.

4.1 Current European defence programmes (orders and deliveries 1998-2000)

Table 4.1 (pages 19-21) identifies Boeing's current participation in European defence programmes (based on orders and deliveries 1998-2000). The key points are as follows:

- *Helicopters* – Boeing (and especially the former McDonnell Douglas business) has made significant sales of helicopters to Europe. Most significantly, the company has sold the AH-64D Apache to the UK (licensed production together with extensive UK off sets) and the Netherlands and the AH-64A to Greece. The company has also sold the CH-47 to the Netherlands and Greece under the FMS programme.
- *Strike missiles/ordnance* – orders and deliveries for the AGM84 Harpoon, Hellfire II, JDAM, Tomahawk and Meteor.
- *Special mission aircraft* – NATO AWACS and a sub-contractor to BAE Systems on the Nimrod 2000 programme
- *Tactical fighters* – F/A-18A has been purchased by Spain and Spain and Italy operate the AV-8B for which Boeing benefits from on-going spares and support contracts.
- *Military transports* – in 2000, the UK became the first foreign customer for the C-17 when it announced that it would lease four aircraft as an interim solution before delivery of the Airbus A400-M.

4.2 Potential future programmes

Boeing has an interest in a number of future European programmes and these are listed in Table 4.2 (pages 22-24). The most significant include:

- *Tactical fighters* – as the largest transatlantic military programme, the Joint Strike Fighter is the most important potential future programme for Boeing and the outcome of the competition will also have a significant impact on the company's European partners. In addition, the Dutch government has a requirement for a replacement fighter aircraft and an order is expected between 2010-2015.
- *Helicopters* – the UK has a requirement for a Support, Amphibious, Battlefield Rotorcraft (SABR) and Boeing-Bell are offering the V-22 Osprey.
- *Special mission aircraft* – Italy and the UK have requirements for tanker aircraft.
- *NATO TBMD* – Boeing is part of a consortium including EADS.

4.3 European alliances, joint ventures and wholly-owned subsidiaries

Boeing has a surprisingly small footprint in Europe. The company has one joint venture – with Agusta-Westland Helicopters – to deliver training to the British Army in support of sales of the AH-64D Apache. The company has no wholly-owned subsidiaries engaged in the production of defence-related equipment.

Boeing's participation in the Meteor programme

A major development for Boeing was its entry onto the Meteor programme. The Meteor air-to-air missile is a Beyond Visual Range Air-to-Air Missile (BVRAAM). The Meteor will equip Britain's fleet of Eurofighter 2000 aircraft, and would have an inside track on being fitted on the Eurofighters purchased by Germany, Italy, and Spain. Contracts from the four nations could total $5 billion. Sweden is also seeking an advanced AAM for its JAS-39 Gripen, and is considering purchasing such a missile jointly as part of the Eurofighter AAM missile buy. The BVRAAM missile would also be positioned in world markets as a replacement for AMRAAM.

Boeing's entry onto the European *Meteor* team may well open up a range of new possibilities for both Boeing and its European partners. Boeing was added to the team in October 1999 to give the European project credibility in the US market. Boeing is providing aircraft-weapon systems integration, risk management and marketing activities in selected markets and Boeing will lead future sales efforts to US customers for Meteor and Meteor-derived technology. Boeing's participation offers the possibility that the missile could be fitted to Boeing's F/A-18 and F-15 aircraft as part of their upgrades. For Boeing, it offers an opportunity to strengthen its presence in a sector where it is currently relatively weak with the possibility that *Meteor* could offer an alternative to Raytheon in arming the Joint Strike Fighter.[27]

An emerging alliance between Boeing and BAE Systems?

Boeing and BAE Systems have long-standing relationships through the AV-8B and T-45 aircraft programmes in the United States as well as the UK *Nimrod* maritime reconnaissance aircraft upgrade programme. The two companies appear to be deepening these established relationships through a number of formal and informal alliances across a range of activities. Thus, Boeing has entered the *Meteor* BVRAAM (Beyond Visual Range Air-to-Air Missile) team that is led by Matra BAe Dynamics, and BAE Systems is said to have lobbied the UK Ministry of Defence on Boeing's behalf to secure the lease of Boeing C-17 transport aircraft for the RAF. Also, the two companies have jointly acquired a minority stake in Korea Aerospace Industries.

4.4 Acquisitions and divestments involving European companies

Boeing has made no defence-related acquisitions in Europe although there has been periodic speculation in the financial press about a potential merger between Boeing and BAE Systems. However, such a deal appears highly unlikely not least because the political and regulatory barriers to such a deal are significant. Any development of

[27] See John D. Morrocco, 'Looming missile decision to shape transatlantic ties', *Aviation Week & Space Technology*, 7 February 2000.

this kind seems likely to require changes to current US security regulations and BAE Systems has indicated that a large-scale merger is out of the question until a framework has been created that allows US and UK companies to handle sensitive technologies in each other's countries.[28] At the same time, BAE Systems' 20% stake in Airbus Industries presents a further barrier to a corporate-level link-up with Boeing although there has been speculation that Airbus may not be a future core business for BAE Systems.

In the United States, Boeing has divested one defence-related business to a European company. In 2000, Boeing's structural fabrication assets in St Louis were acquired by the UK company GKN in a deal worth $64.1 million.

[28] See Andrew James (2000), op cit in note 2.

Table 4.1 Boeing - Current European defence programmes (orders and deliveries 1998-2000)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
Tomahawk	United Kingdom	Mi	65		1995-98	FMS		
AH-64D Longbow Apache	The Netherlands	Hel	30	1995		FMS with offset	SP Aerospace & Vehicle Systems (NL) Fokker Special Products (NL)	
AH-64D Longbow Apache	United Kingdom	Hel	67	1995	2002	Licensed production	Agusta Westland IT/UK) acting as prime contractor in UK Estimated 180 UK companies guaranteed work including: Rolls-Royce Turbomeca (UK/FR) – engines BAE Systems (UK) – TADS/PNVS Smiths – avionics Racal/Thales (FR) - radar	
CH-47C	The Netherlands	Hel	7	1995	1997	FMS		
F/A-18A	Spain	Ai	30		1998	FMS		

Table 4.1 Boeing - Current European defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
AH64 training	United Kingdom	Oth				Joint venture	Aviation Training International Ltd (Agusta Westland:Boeing)	
Hellfire II	United Kingdom	Mi		Sept 1996		Licensed production	Shorts Missile Systems Ltd (UK//France)	For British Army's AH-64D Apaches
Harpoon missiles	Greece	Mi	32	Requested December 1998		FMS	Offset expected	For Greek KIDD class guided missile destroyer order
AH-64A Apache	Greece	Hel	4	Requested June 1999		FMS		
CH-47D	Greece	Hel	7	Requested Nov 1999		FMS		Contract worth over $200m
Nimrod 2000	United Kingdom	Ac; El				Sub-contractor	BAE Systems	Boeing supplying tactical command system for upgrade to maritime patrol aircraft
NATO AWACS	NATO	Ac/El					Boeing Operations International supports NATO AWACS via IADS (Germany), Air France (France); BAE Systems (UK)	
HELLFIRE II	Greece	Mi	200	Feb 2000	Nov 2001	FMS		

Table 4.1 Boeing - Current European defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
Predator	Italy	Ac/El	6			Sub-contractor to General Atomics (US)	Meteor (Italy)	Intelligence workstation and mission planning system for UAVs.
Meteor	United Kingdom	Mi		2000		Teaming	Matra Bae Dynamics (UK/France) Alenia Marconi Systems (Italy) EADS (France/Germany/Spain) Saab Dynamics (Sweden)	Orders from France, Germany, Spain, Italy & Sweden expected to follow. Potential joint development of Meteor BVRAAM for US market
C-17	United Kingdom	Ac	4	2000		Leasing	BAE Systems	
AV-8B Harrier	Spain	Ac;El	2 (+ option on 7)	May 2000	2003+	FMS	Rolls-Royce (UK) BAE Systems (UK) Raytheon (US)	Remanufacturing to Harrier II Plus configuration
JDAM	Denmark	SA/O	400	July 2000		Offset agreements likely		JDAM kits worth $40m
Harpoon	Germany Greece Denmark Netherlands Spain United Kingdom	Mi		August 2000		FMS		Sale of spares
Hellfire II	Greece	Mi	200	Feb 2000	Nov 2001	FMS		
French AWACS	France/NATO	El	4	Feb 2001	October 2002	Subcontract	Air France Industries	$25.5m

Table 4.2 Boeing - potential future programmes

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
Joint Strike Fighter	United Kingdom (full partner) Denmark, Norway, The Netherlands (associated partners) Italy (informal partner)	Ac	Co-development	Aerosystems International (UK) BAE Systems (UK) Dowty Aerospace (UK) Fokker (The Netherlands) FHL (UK) Flight Refuelling (UK) IFAD (Denmark) Martin-Baker (UK) Messier-Dowty (UK) Perot Systems (The Netherlands) Philips (The Netherlands) Rolls-Royce (UK) Terma (Denmark)	Concept demonstrator
NATO Theatre Ballistic Missile Defence (TBMD)	NATO	Mi		EADS (FR) IABG (GER) DERA (UK) TNO (NL)	Consortium established to bid for one of two feasibility studies expected to be let in May 2001
Brimstone	United Kingdom	Mi	Co-development	Alenia Marconi Systems (UK/Italy)	

Table 4.2 Boeing - potential future programmes (cont)

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
Strategic Tanker Aircraft	United Kingdom	Ac	Teaming	BAE Systems	Offering B-767 for UK requirement
Tanker-transport	Italy	Ac	Offset	Alenia Officine Aeronavali Venezia	4 aircraft worth $726M against Airbus A330-200
UK Support, Amphibious & Battlefield Rotorcraft	United Kingdom	Hel	Licensed production likely	Either BAE Systems or Augusta Westland	Offering V-22 Osprey to UK Royal Navy & Royal Air Force
C-17	United Kingdom	Ac			Potential that C-17 will be used to fulfil UK's Short Term Strategic Airlifter requirement if the Airbus Military Co. A400M does not result in an acceptable offer.

Table 4.2 Boeing - potential future programmes (cont)

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
Dutch fighter aircraft requirement	Netherlands	Ac	?	?	F/A-18E/F versus Dassault; SAAB/BAES; Eurofighter; JSF; Lockheed Martin. The order is expected to be for 100-120 aircraft and is expected to be placed between 2010-2015.
UK Bomb Enhancement Program (BEP)	United Kingdom	SA/O	Teaming	Boeing part of Striker Team: Alenia Marconi Systems (Netherlands) (prime) Hunting Engineering (UK)	Schedule, program value & competitive field have yet to be determined. Boeing offering JDAM

Table 4.3 Boeing - European alliances, joint ventures and wholly-owned subsidiaries

Name	Type of relationship	European partner(s)	Sector	Comments
Aviation Training International Ltd	50:50 joint venture	Agusta-Westland Helicopters	Oth	AH-64 training for British Army

Table 4.4 Boeing - acquisitions and divestments involving European companies

Year	Transaction	European company involved	Sector	Comment
2000	Divestment	GKN PLC (UK)	Ai/Mi	$64.1m - GKN Plc completed its acquisition of Boeing Co.'s structural fabrication assets in St Louis, Missouri. The new GKN Aerospace Services-St. Louis becomes a strategic supplier to the US firm's military aircraft and missile systems group. The facility makes carbon fibre and aluminium frame and fuselage parts for Boeing F/A-18E/F and C-17 planes, and is also a supplier for Boeing's Joint Strike Fighter candidate.

5. Lockheed Martin

Lockheed Martin has a strong position in the European defence market. The company is participating on a range of current European defence programmes and has a significant European footprint through a network of alliances, joint ventures and wholly-owned subsidiaries.

5.1 Current European defence programmes (orders and deliveries 1998-2000)

Lockheed Martin's participation in current European defence programmes is set out in Table 5.1 (pages 29-33). Key programmes include:

- *Aircraft* – Lockheed Martin has made significant sales of aircraft to Europe not least through the F-16 programme. The F-16 was co-produced in Europe by Belgium and the Netherlands for Denmark, Norway and Greece. The F-16 Middle Life Update (MLU) programme is on-going and – in 2000 - Greece announced its intention to buy a further 50 F-16s. The C-130 is used extensively by European air forces and the UK and Italy are customers for the C-130J.
- *Missiles and fire control systems* – Lockheed Martin has made significant sales of PAC-3 to Germany (licensed production), Greece and the Netherlands (FMS) and MLRS/GMLRS to the UK, France, Germany, Italy, the Netherlands, Denmark and Norway (through licensed production in Europe by MLRS Europaische Produktion and GLVS GmbH and FMS). In addition, it has sold Hellfire II to the UK (licensed production) and Greece (FMS), ATACMS to Greece (FMS) and Javelin to Spain (FMS). Longbow FCR as part of the sale of the AH-64 Apache to the UK, the Netherlands and Greece. Lockheed Martin is also part of the MEADS consortium.
- *Naval systems* – Lockheed Martin is supplying the AEGIS combat system to Spain for its new F-100 frigates and integrated weapon systems to Norway for its new frigate programme. The sale to Norway is as part of the AFCON consortium with Bazan of Spain and General Dynamics/Bath Iron Works.
- *Platform integration* – Lockheed Martin is acting as prime contractor on the UK EH-101 Merlin programme and was prime for the Sikorsky SH-60B helicopters sold to Spain and Greece.
- *Space* – Lockheed Martin is prime contractor for the UK's Trident ballistic missile programme.

5.2 Potential future programmes

Lockheed Martin also has positions on a range of potential future European programmes. Table 5.2 (pages 34-36) highlights the company's interest in programmes such as:

- *Aircraft* – the Joint Strike Fighter is the dominant future aircraft programme and the largest potential future European programme for Lockheed Martin. In addition, Lockheed Martin is likely to bid the Advanced F-16 to meet the Dutch government's fighter aircraft requirement. Lockheed Martin is also part of the team performing feasibility and concept studies for the UK's Future Offensive Air Capability programme and is teaming on a bid for the UK's Watchtower UAV programme.

- *Naval Systems* – Lockheed Martin is teamed with Thales (France) and Raytheon to bid for the UK's Future Aircraft Carrier programme estimated to be worth $2,450 million.
- *Systems integration* – with BAE Systems, Lockheed Martin is bidding for the UK/US TRACER/Future Scout Cavalry System.
- *C4I* – Lockheed Martin is bidding for the UK's Cooperative Engagement Capability programme and is teamed with Thales (France) and several UK companies on a bid for the UK Air Command and Control System.
- *Space* – the UK, France and Germany have a major requirement for military communications satellites. In the UK, the Skynet 5 competition is estimated to be worth $2,000 million.

5.3 European alliances, joint ventures and wholly-owned subsidiaries

Lockheed Martin has a significant footprint in Europe as a consequence of strategic alliances, joint ventures and wholly-owned subsidiaries and these are listed in Table 5.3 (page 37).

Strategic alliances – the Advanced Frigate Consortium (AFCON)

AFCON is worthy of comment. A strategic alliance between Bazan (Spain), General Dynamics/Bath Iron Works and Lockheed Martin, the consortium has been established to design and manufacture frigates for international naval customers. Lockheed Martin and Bazan are currently working together on the Spanish F-100 frigate programme where Lockheed Martin is supplying the AEGIS combat system. The consortium is actively exploring other opportunities. AFCON is significant because the European naval systems business has traditionally been almost impervious to transnational sales and programmes and recent European/NATO efforts to develop collaborative programmes in the area have run into trouble (not least the Horizon frigate programme and before that the NATO AFR90 programme).

Joint ventures

Lockheed Martin is a partner in a number of joint ventures:

- A number of the joint ventures are products of NATO collaborative armaments programmes not least those related to the MLRS programme (MLRS Europaische Produktion and Euro Rocket System) and MEADS (MEADS International).
- Lockheed Martin is also a partner with BAE Systems in Team Sika established to bid for the TRACER/Future Scout Cavalry System programme.
- Lockheed Martin-Alenia Tactical Transport Systems joint venture was established to develop the C-27J medium transport aircraft as part of the off-set deal accompanying Italy's purchase of the C-130J[29] LMATTS is developing and marketing the C-27 transport aircraft.

[29] Pierre Sparaco, 'US, Europe explore transatlantic partnerships', *Aviation Week & Space Technology*, 13 September 1999, pp. 37-8.

Wholly-owned subsidiaries

Lockheed Martin UK was established in 2000 to combine all of Lockheed Martin's defence, civil and commercial interests in the UK. The company has annual sales of around £600m ($840m) and employs more than 1,000 people at over 20 UK facilities.

An emerging alliance with EADS?

EADS appears to be building on Aerospatiale-Matra's links with Lockheed Martin to form a broader alliance. Aerospatiale and Lockheed Martin have been exploring links for some time, not least in the area of the proposed Multi-Role Tanker/Transport derivative of the Airbus A310 commercial transport as a potential bid for the KC-X. In 1999, the companies joined forces to bid for a British requirement for tanker aircraft.[30]

5.4 Acquisitions and divestments involving European companies

In October 1999, Lockheed-Martin announced a radical restructuring of its organisation, including a major disposal programme. The objective was said to be to focus the company on what it regarded as its core business of systems integration and reduce the company's debt burden through the divestment of non-core businesses representing $1.8 billion in sales for 1998. This disposal programme provided UK-company BAE Systems with the opportunity to significantly increase its position in the US. In May 2000, BAE Systems acquired Lockheed Martin Control Systems and in July 2000 Lockheed Martin Aerospace Electronics Systems. The significance of these transactions is discussed in the profile of BAE Systems later in this study.

[30] Pierre Sparaco and John D. Morrocco, 'Aerospatiale to explore Lockheed Martin link', *Aviation Week & Space Technology*, 20 January 1997, p. 26; John D. Morrocco, 'Lockheed Martin talks with Airbus partners', *Aviation Week & Space Technology*, 5 May 1997, pp. 20-1; Pierre Sparaco, 'US, Europe explore transatlantic partnerships', *Aviation Week & Space Technology*, 13 September 1999, pp. 37-8.

Table 5.1 Lockheed Martin - Current European defence programmes (orders and deliveries 1998-2000)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
EH-101 Merlin	United Kingdom	Hel	44	1979	1999	Teaming	Agusta Westland (Italy/UK)	Lockheed Martin ASIC of Portsmouth is carrying out systems integration for the Merlin helicopter.
Trident D-5	United Kingdom	Mi	48	1982	1999	FMS		
P-3C	Netherlands	Ac; El	7	1991	2001	FMS		Upgrade
Spanish F-100 frigate programme	Spain	Sh	4	1992	2002	FMS	Bazan	Supplying AEGIS combat system
F-16	Belgium The Netherlands Norway	Ac	110	1993	1998	Co-production	SABCA (Belgium) SONACA (Belgium) Techspace Aero (Belgium) MBLE (Belgium) Fokker (Netherlands) Hollandisk Signaal (Netherlands/France) Dutch Research Laboratory (Netherlands) Nordisk Aluminium (Norway) Kongsberg (Norway) NERA (Norway)	

Table 5.1 Lockheed Martin - Current European defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved
C-130J	United Kingdom	Ac	25	1994	1999 (but delayed)	FMS with offset	Offset involved established of LMATTS Offset to value of 20% of each aircraft provided by consortium of 50 UK companies
AH-64D Longbow Apache	The Netherlands	Hel	30	1995		FMS	
AH-64D Longbow Apache	United Kingdom	Hel	67	1995	2002	Licensed production	Agusta Westland acting as prime contractor in UK Lockheed Martin (US) Northrop Grumman (US) Shorts (UK)
TADS/PNVS	United Kingdom	El	71		1998+	Teaming	BAE Systems (UK) Pilkington Optronics (UK/FR)
C-130	Spain	Ac	12	1995	1999	FMS	
M270 MLRS	Denmark Norway	Mi	436	April 1996	Nov 2000	FMS	
ATACMS	Greece	Mi	81	Sept 1996	1998	FMS	
Hellfire II	United Kingdom	Mi		Sept 1996		Licensed production	Shorts Missile Systems Ltd (UK//France)

Table 5.1 Lockheed Martin - Current European defence programmes (orders and deliveries 1998-2000) (cont)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved
F-16 MLU	Belgium Denmark Netherlands Norway	Ai		Nov 1996	2006	FMS	SABCA (Belgium)
C-130J	Italy	Ai	18	Nov 1997		FMS with offset	
Patriot PAC-3	Germany Greece			1998		Licensed production	EADS
Mk 41 VLS	Germany Netherlands Spain	Mi		Jan 1998	Sept 2006	FMS	
COBRA	United Kingdom Germany France	El	29	Mar 1998	Dec 2005	Co-development	Euro-ART
Longbow FCR	United Kingdom	El		April 1998	2002		BAE Systems (UK)
GMLRS	UK France Germany Italy The Netherlands	Mi		Nov 1998	Oct 2002	Co-development	Diehl (Germany) Aerospatiale Missiles (FR) Fiat Avio (IT) Matra BAE Dynamics (UK/FR)
MEADS	NATO	Mi/El	$300m	May 1999	2002	Co-development	DASA/EADS (Germany) Alenia Marconi Systems (Italy/UK)
TADS/PNVS	Greece	El		Requested June 1999		FMS	

Table 5.1 Lockheed Martin - Current European defence programmes (orders and deliveries 1998-2000) (cont)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved
M26A1 ERR MLRS	Denmark	Mi	225	Oct 1999		FMS	
Javelin	Spain	Mi	12 systems worth $25m	Aug 1999		FMS	
SH-60B	Spain	Hel	6	Sept 1999	Nov 2003	FMS	
PAC-3	Netherlands	Mi	$515m for 128 PAC-3	Requested Nov 1999		FMS	
APG-78 Longbow FCR	Netherlands	El	30 worth $225m	Requested Nov 1999			
UK Sender	United Kingdom	Ac				Teaming	Lockheed Martin UK Hunting Engineering (UK) Defence Evaluation & Research Agency (UK)
Hellfire II	Greece	Mi	200	Feb 2000	Nov 2001	FMS	
F-16 MMC Phase III	Belgium Denmark Norway	El		March 2000	Dec 2004		
AN/AAQ-14 LANTIRN	Belgium	El	$25m	Requested April 2000		Commercial sale	

Table 5.1 Lockheed Martin - Current European defence programmes (orders and deliveries 1998-2000) (cont)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved
Royal Norwegian Navy frigate programme	Norway	Sh	5	June 2000	June 2010	Teaming	Bazan (Spain) Kongsberg Defence & Aerospace (NOR) NERA (Norway) Mjellum & Karlsen (Norway)
F-16C/D	Greece	Ac	50	June 2000	April 2004	FMS	
P-3C upgrade	Netherlands	El	$200m	Aug 2000	Feb 2003	FMS	
CEC Phase I study	United Kingdom	El		Oct 2000			
TRIDENT	United Kingdom	Oth		Nov 2000	Jan 2003	FMS	
F-16	Italy	Ac	34	March 2001	2003-	Lease	
Danish Aerotech	Denmark	Oth				Joint venture	TERMA Manfacturing (Denmark) FLS Aerospace (UK)
Medium Extended Air Defence System (MEADS)	NATO (US; Germany; Italy)	Mi; El				Co-development	EADS/LFK (Germany) Alenia Marconi Systems (Italy/UK)
MLRS	Denmark	Mi				Co-production	Kvaerner Eureka

Table 5.2 Lockheed Martin - Potential future programmes

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
UK Air Command and Control System (UKACCS)	United Kingdom	EI	Teaming	Hunting Engineering (UK) Smiths Industries (UK) Thales (FR)	Requirement announced Sept 1999
Dutch fighter aircraft requirement	Netherlands	Ac	?	?	Advanced F-16 versus Dassault; SAAB/BAES; Eurofighter; JSF; Boeing. Order for 100-120 aircraft expected to be placed 2010-2015.
Joint Strike Fighter	United Kingdom (full partner) Denmark, Norway, The Netherlands (associated partners) Italy (informal partner)	Ac	Co-development	BAE Systems (UK) Rolls-Royce (UK) Fokker (Netherlands) Airbus Industrie (Europe) National Aerospace Laboratory (Netherlands)	Concept demonstrator

Table 5.2 Lockheed Martin - Potential future programmes (cont.)

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
NATO Theatre Ballistic Missile Defence (TBMD)	NATO	Mi	Teaming	Aerospatiale Matra Missiles (France) Alenia Marconi Systems (UK/Italy) BAE Systems (UK) EADS/LFK (Germany) Matra-Bae Dynamics (France/UK) TRW Space & Missile Systems Division (US)	Team Janus consortium established to bid for one of two Feasibility Study Contract expected to be awarded May 2001
UK Skynet 5	United Kingdom	El	Co-development	BAE Systems, British Telecom	LM part of Rosetta consortium in military communications satellite competition. Delivery date 2017.
TRACER/Future Scout Cavalry System	United Kingdom	MV	Co-development	BAE Systems & others in SIKA International joint venture	
UK Future Aircraft Carrier (CVF)	United Kingdom	Sh	Teaming	Thales (France) BMT Defence Services Raytheon	Programme assessment phase
Cooperative Engagement Capability	United Kingdom	El	Foreign Military Sale	Lockheed Martin UK	Assessment Phase – bidding against Raytheon

Table 5.2 Lockheed Martin - Potential future programmes (cont.)

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
Sonar 2087	United Kingdom	El	Teaming	Babcock Defence Systems (prime) Cogent J&S Marine BMT (UK) Indal Technologies (Canada) STN Atlas Elektronik (Germany) Ultra Electronics (UK) Northrop Grumman (US)	ASW system for British Royal Navy's Type 23 frigate (currently at assessment phase).
UK Watchtower UAV	United Kingdom	Ac;El	Teaming	Lockheed Martin Tactical Systems (UK) Hunting Engineering (UK)	Assessment phase began 2000
Future Offensive Air Capability	United Kingdom	Ac;Mi	Teaming	Matra BAe Dynamics BAe Airbus Flight Refuelling Limited	Team has been by UK Ministry of defence to perform feasibility & concept studies for FOAC CALCM system & missile
UK NLAW	United Kingdom	Mi		MatraBAE Dynamics	Next-generation Light Anti-Armour weapon

Table 5.3 Lockheed Martin - European alliances, joint ventures and wholly-owned subsidiaries

Name	Type of relationship	European partner(s)	Sector	Comments
AFCON (Advanced Frigate Consortium)	Strategic alliance	Bazan (Spain) General Dynamics Bath Iron Works (US)	Sh	Alliance to design & manufacture frigates for international naval customers
Next-generation computer-based aircraft development tools and processes	Strategic alliance	Dassault Systemes (France) IBM (US)	Oth	
Lockheed Martin Alenia Tactical Transport Systems	Joint venture	Alenia (Italy)	Ai	Developing & marketing C-27 transport aircraft as part of off-set deal for Italian C-130J
Euro-Art Radar Technology GmbH	Joint venture	Siemens (Germany) Thales (France)	El	To produce COBRA artillery locating radar
Euro Rocket System GmbH	Joint venture	Diehl (Germany)	Mi	Marketing MLRS launchers
MLRS Europaische Produktion GmbH	Joint venture	Diehl (Germany) BPD (Italy) Matra BAe Dynamics (UK/France) Hunting Defence (UK)	Mi	Joint venture for licensed production of Multiple Launch Rocket System
GLVS GmbH	Joint venture	DASA/EADS (Germany)	Mi	Co-production & marketing of PAC-3 missile to Patriot user nations
MEADS International	Joint venture	DASA/EADS (Germany) Alenia (Italy)	Mi	MEADS programme
Team Sika International	Joint venture	BAE Systems (UK)	MV	TRACER/Future Scout Vehicle Project
Lockheed Martin UK	Wholly-owned subsidiary		Ai; El; Oth	Annual sales of £600m ($840m), employing more than 1,000 people at over 20 facilities
LM GmbH	Wholly-owned subsidiary		El; Sh	Works with German companies Blohm & Voss, HDW and STN upgrading German Navy surface ships

5.4 Acquisitions and divestment involving European companies

Year	Transaction	European company involved	Sector	Comment
May 2000	Sale of Lockheed Martin Control Systems	BAE Systems (UK)	El	$0.51bn
July 2000	Sale of Lockheed Martin aerospace electronics business	BAE Systems (UK)	El	$1.67bn

6. General Dynamics

General Dynamics has established itself in the European market through the acquisition of Computing Devices International and Spanish tank manufacturer Santa Barbara. Whilst Foreign Military Sales to Europe have been modest in recent years, the company is competing for a major contract for tanks from Greece. At the same, its UK wholly-owned subsidiary Computing Devices International has a position on a range of European military aircraft programmes. In addition, General Dynamics has made it clear that it would be interested in more European acquisitions if the cross-border consolidation of Europe's armoured vehicle industry were to get underway.

6.1 Current European defence programmes (orders and deliveries 1998-2000)

General Dynamics' participation in current European programmes is set out in Table 6.1 (pages 42-43):

- *Information systems/avionics* – through its UK subsidiary Computing Devices Ltd, General Dynamics has a position on a range of European military aircraft programmes. Computing Devices Ltd describes itself as one of the largest avionics suppliers to the EF-2000 Eurofighter providing twelve of the avionics sub-systems to the programme. In addition, Computing Devices Ltd. Supplies mission computers and navigation computers to the Tornado GR1, Harrier GR7 and Nimrod MR2. The company also supplies weapon management systems to the Hawk, Marlin HAS1, Tornado ADV and Mirage III. Through the FMS programme, General Dynamics has sold AN/UYS-2A(V) DEM E signal processing computers to Spain as part of the F-100 frigate programme and in support of its AEGIS combat system.
- *Weapons systems* –General Dynamics has sold its Hydra-70 air-to-ground rocket system to Germany (for its Tiger attack helicopter programme) and to the Netherlands.

6.2 Potential future programmes

General Dynamics has an interest in a number of potential future European programmes and these are set out in Table 6.2 (page 44). Significant programmes include:

- *Bowman* – Computing Devices Canada, a General Dynamics subsidiary company, is bidding for the UK's requirement for a communications system for the British Army. The contract is estimated to be worth $2,500 million and this is the second time the competition has been let. The original winners – the Archer consortium including ITT (US) and BAE Systems – were removed from the programme by the UK Ministry of Defence as a consequence of programme failures and cost overruns. Computing Devices Canada is offering a system developed and introduced for the Canadian military.
- *Greek main battle tank* – General Dynamics is bidding for a contract to supply 250 main battle tanks to Greece under FMS followed by licensed production in Greece. The procurement process entered its final phase in January 2001 although there has been speculation that Greek budget constraints been that the size of the programme may be scaled back.
- *TRACER/Future Scout Cavalry System* – a team of Vehicle Armour & Armament Ltd – a joint venture between General Dynamics and Vickers

Defence Systems of the UK – and BAE Systems is bidding for this US-UK programme for 1,050 armoured vehicles for the US Army and 335 for the British Army. There has been considerable speculation as to whether this programme will go ahead because of changes in US Army requirements.

6.3 European alliances, joint ventures and wholly-owned subsidiaries

General Dynamics has a significant European footprint through strategic alliances, joint ventures and – in particular – wholly-owned subsidiaries and these are set out in Table 6.3 (page 45).

Strategic alliances - AFCON

With Lockheed Martin, General Dynamics/Bath Iron Works is part of the AFCON consortium with Bazan (Spain) that has been established to design and manufacture frigates for international naval customers. It has already been noted that AFCON is significant because the European naval systems business has traditionally been almost impervious to transnational sales and programmes. Potentially, AFCON provides an opportunity for Bath Iron Works to enter the European and other international markets.

Joint ventures

In May 1999, General Dynamics established Vehicle Armour & Armament Ltd. - a joint venture with Vickers Defence Systems (UK) – to design and produce a demonstrator chassis and weapon systems for the UK-US TRACER-Future Scout Cavalry System.

Wholly-owned subsidiaries

It has already been noted that Computing Devices Ltd. has positioned General Dynamics in a range of European programmes. The acquisition of Spanish tank and armaments manufacturer Santa Barbara will provide General Dynamics with a wholly-owned subsidiary that can potentially participate in any future consolidation of the European land systems sector.

6.4 Acquisitions and divestments involving European companies

General Dynamics has made two important acquisitions that have provided it with a significant position in the European defence market (see Table 6.4 page 46).

Computing Devices International

The acquisition of Computing Devices International in December 1997 not only broadened General Dynamics' businesses in electronics, large-scale system integration and high-speed data processing but – through Computing Devices Ltd. – placed the company on a range of European defence programmes.

Santa Barbara

In April 2000, it was announced that General Dynamics was to acquire Empresa Santa Barbara de Industrias Militares (ENSB), the Spanish combat vehicle and munitions

manufacturer.[31] The acquisition of Santa Barbara by General Dynamics can be seen as significant for a number of reasons. Firstly, it is one of very few examples of sizeable acquisitions of European defence assets by a US company. Secondly, it is the only example of a transatlantic acquisition of a platform manufacturer. Thirdly, it involved the land systems sector which – in Europe – has been the subject of little consolidation, continues to be fragmented and remains politically sensitive.

General Dynamics' acquisition of Santa Barbara illustrates some of the challenges that can face defence companies (either American or European) when they make overseas acquisitions. The announcement provoked a considerable political dispute in which the German government – on behalf of Krauss-Maffei Wegmann – raised its concerns over the deal with the Spanish government. Krauss-Maffei Wegmann had also bid for Santa Barbara and there is little doubt that part of the protest was stimulated by its concern about the entry of a powerful US competitor into Europe. However, the company also had another concern. Santa Barbara is manufacturing the German Leopard 2 tank under license and there were German concerns about the leakage of technology to General Dynamics.

In April 2001, it was reported that German firm Krauss-Maffei Wegmann had signed a technology transfer agreement freeing the sale of Santa Barbara to General Dynamics and the sale of the state-owned company was approved by the Spanish government. The final price was $4.4m and General Dynamics has promised to invest $60 million in the company. The acquisition gives General Dynamics a position in the European land systems sector and also positions it to take advantage of Spanish plans to modernise its armoured vehicle fleet.

Future consolidation of the European land systems sector

Significantly, General Dynamics has made it clear that it would be interested in more European acquisitions if the cross-border consolidation of Europe's armoured vehicle industry were to get underway[32]. Indeed, there has been speculation that General Dynamics may seek to acquire Vickers Defence Systems in the UK. The Vickers Group was acquired by Rolls-Royce in 2000 and it seems likely that Rolls-Royce will divest Vickers Defence Systems.

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[31] General Dynamics Corp. 'General Dynamics to buy Spain's ENSB, maker of combat vehicles and munitions', *News Release*, 13 April 2000, General Dynamics Corp., Falls Church, VA.

[32] Comments by General Dynamics Chairman Nicholas Chabraja quoted in Alexander Nicholl "General Dynamics interested in more European deals", *Financial Times*, April 1 2001.

Table 6.1 General Dynamics - Current European defence programmes (orders and deliveries 1998-2000)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
Eurofighter Typhoon	United Kingdom Germany Italy Spain	Ac;El	Computing Devices Ltd is one of the largest avionics suppliers contributing to 12 of the avionics sub-systems through Computing Devices (UK)					
Tornado GR1	United Kingdom Germany Italy	Ac;El	Computing Devices Ltd (UK) supplies mission computers & navigation computers					
Harrier GR7	United Kingdom	Ac;El						
Nimrod MR2	United Kingdom	Ac;El						
Hawk	United Kingdom & exports	Ac;El	Computing Devices Ltd (UK) supplies weapon management systems					
Merlin HAS1	United Kingdom	Hel;El						
Tornado ADV	United Kingdom Germany Italy	Ac;El						
Mirage III	France	Ac;El						
MINDER	United Kingdom	Oth	$8.7m	Nov 2000	August 2002	Teaming	Ultra Electronics (UK) Hunting Engineering (UK)	Computing Devices (Canada) part of team on mine detection programme
Future Tank Main Armament Program	United Kingdom Germany France	MV/Oth				R&D programme	BAE Systems (UK) Rheinmetall (Germany) GIAT (France)	Programme to develop main gun & ammunition
HYDRA 70 unguided rocket	Germany	Mi		Oct 1998		Direct sale		For Tiger attack helicopters

Table 6.1 General Dynamics - Current European defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
HYDRA-70 rocket	Netherlands	Mi	9,036 (to NL & Egypt)	1997	April 1999	FMS		
AN/UYS-2A(V) DEM E.	Spain	El	4		FMS			Signal processing computer
Technical support contract in support of the Hydra Program.	Sweden	Oth	$6.1m		Direct sale			Computing Devices is supporting development of Swedish Hydra underwater sonar programme

Table 6.2: General Dynamics - Potential future programmes

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
TRACER/Future Scout Vehicle Project	United Kingdom	MV	Co-development	Vehicle Armour and Armament Ltd (joint venture with Vickers Defence Systems) BAE Systems	335 for UK 1050 for US Army
Greek main battle tank	Greece	MV	FMS followed by licensed production		250 tanks. Procurement entered final phase Jan 2001
UKACCS	United Kingdom	EI			Computing Devices Ltd has expressed interest in participating. Delivery date is 2006.
Bowman	United Kingdom	EI			Computing Devices Canada bidding for $2.5 bn. military communications system

Table 6.3: General Dynamics - European alliances, joint ventures and wholly-owned subsidiaries

Name	Type of relationship	European partner(s)	Sector	Comments
AFCON (Advanced Frigate Consortium)	Strategic alliance	Bazan (Spain) Lockheed Martin (US)	Sh	Alliance between Bath Iron Works and partners to design & manufacture frigates for international naval customers
Vehicle Armour and Armament Ltd.	Joint venture	Vickers Defence Systems (UK)	MV	Established in May 1999 to design and produce a demonstrator chassis and weapon systems for the UK-US TRACER-Future Scout Cavalry System (FSCS).
Computing Devices Ltd	Wholly-owned subsidiary		El	Located in the UK, Computing Devices designs electronics & software for reconnaissance systems, avionics & digital battlespace.
Santa Barbara	Wholly-owned subsidiary (subject to approval)		MV; SA/O	In April 2001, it was reported that German firm Krauss-Maffei Wegmann had signed a technology transfer agreement freeing the sale of Santa Barbara to General Dynamics.
Page Europa S.p.A. is a	Wholly-owned subsidiary		El	Italy-based supplier of military communications equipment. A leading customer is the North Atlantic Treaty Organization (NATO).

Table 6.4: General Dynamics - Acquisitions and divestment involving European companies

Year	Transaction	European company involved	Sector	Comment
December 1997	Acquisition	Computing Devices Limited	El	Part of acquisition of Computing Devices International from Ceridian Corporation
April 2000	Acquisition (awaiting approval)	Santa Barbara (Spain)	MV	Final approval of $0.05bn acquisition expected April 2001. In April 2001, it was reported that German firm Krauss-Maffei Wegmann had signed a technology transfer agreement freeing the sale of Santa Barbara to General Dynamics.

7. Raytheon

Raytheon has a substantial position in the European defence market and - unlike many other major US defence contractors - has an overseas production presence. Raytheon executives are on record as saying that the company's continued growth will require even closer collaboration and enhanced teaming relationships with industry in Europe. To this end, Raytheon announced in 2000 the formation of Thales Raytheon Systems Co. – a joint venture with French company Thales that represents one of the most significant developments in transatlantic defence industrial relationships in recent years – not least because it signifies an unprecedented level of US-French defence industrial collaboration.

7.1 Current European defence programmes (orders and deliveries 1998-2000)

Raytheon's participation in current European programmes is set out in Table 7.1 (pages 50-54):

- *Missile systems* – As the world's largest missile manufacturer, Raytheon has a range of European customers both through FMS, licensed production and teaming. In the period studied, Raytheon has received orders or made deliveries of the AIM-120 AMRAAM to the United Kingdom, Belgium, Greece, the Netherlands, Norway, Spain, Italy and Greece. In addition, there have been sales of the SM-2 Standard missile (Spain, the Netherlands, Germany and Italy), Harpoon missiles (Greece), MK 46 torpedoes (Greece), AGM Maverick (Belgium and Italy), Javelin anti-tank weapons (Spain), Stinger (United Kingdom, Greece and Italy), AGM-88 HARM (Germany) and Rolling Airframe Missile (co-produced with Germany). Also, the United Kingdom has ordered UGM-109 Tomahawk missiles. Raytheon has also benefited from spares and engineering service contracts for installed systems such as the Hawk (the Netherlands, Spain and Sweden) and Harpoon (Germany, Greece, Denmark, the Netherlands, Spain and the United Kingdom).
- *Air defence systems* – Raytheon is part of the Patriot PAC-3 programme with customers in Germany, Greece and the Netherlands. In addition, Raytheon is supplying radar and AMRAAM for the Norwegian Advanced Surface-to-Air Missile System (NASAMS).
- *Airborne surveillance* – Raytheon was the successful bidder for the UK Airborne Stand-off Radar (ASTOR) programme worth $1,300 million.
- *Radar systems* – Raytheon is part of a team led by BAE Systems that is supplying the FCR-90 radar for the EF2000 Eurofighter programme and the AN/APS-137B(V)5 radar to the Dutch P-3 aircraft upgrade programme. Raytheon is also supplying the AN/APG-65 radar as part of the upgrade of Spain's AV-8B aircraft.
- *Naval systems* – Raytheon is supplying sonar systems to the Spanish Navy for its minesweepers and F-100 frigate programme through a co-production agreement with Spanish company Indra and Raytheon's Spanish joint venture company ENOSA.
- *Ordnance* – Raytheon has made significant sales of Paveway laser guided bombs to France and the United Kingdom.

- *Aircraft* and aircraft integration – In August 1999, Raytheon announced the sale of T-6A training aircraft to Greece and is teamed with Airbus in the sale of Airbus A310 Multi-Role Tanker Transport aircraft to Germany.
- *Other programmes* – Raytheon is the contractor (with a UK team) on the UK Successor Identification Friend or Foe programme that is estimated to be worth $148 million.

7.2 Potential future programmes

Raytheon has an interest in a considerable number of potential future European programmes and these are set out in Table 7.2 (pages 55-56). Programmes of particular note include:

- *NATO Theatre Ballistic Missile Defence (TBMD)* – Raytheon is part of a team that includes European companies Thales (France) and EADS (Germany).
- *UK Future Aircraft Carrier* - Raytheon is part of a team which – again – includes Thales (France).
- *Cooperative Engagement Capability* – a programme to integrate the UK Royal Navy's air defence assets.

7.3 European alliances, joint ventures and wholly-owned subsidiaries

Raytheon has a relatively large European footprint of strategic alliances, joint ventures and a number of wholly-owned subsidiaries and these are set out in Table 7.3 (page 57).

Strategic alliances

Raytheon has a relationship with Airbus to use its aircraft as platforms for AEW and tankers. In addition, the company has a relationship with the German missile manufacturer BGT

Joint ventures - Thales Raytheon Systems Co.

There is little doubt that the most significant recent development has been the establishment of Thales Raytheon Systems Co – a joint venture between French company Thales (formally known as Thomson-CSF) and Raytheon in the area of air defence, command and control and ground-based radar. In December 2000, Raytheon and Thales entered into an agreement to form an equally owned joint venture encompassing air defence/command and control centres and ground-based air surveillance and weapons locating radar. The air traffic management businesses of both companies are not included in the joint venture and will continue to compete in the ATM market place. Raytheon's C3I segment has responsibility for the company's participation in the joint venture that will have approximately 1,300 employees worldwide and pro forma revenues of approximately $500-700 million.

The Raytheon-Thales relationship can be seen as another emerging axis of transatlantic defence industrial cooperation. Raytheon's relationship with Thales/Thomson-CSF goes back a number of years and the companies collaborate as joint developers, integrators and suppliers to each other on 17 industrial

programmes.[33] A Raytheon-Thales consortium is installing a new air defence system for Switzerland and a Raytheon-Thales joint venture – Air Command Systems International – was awarded the NATO air command and control contract. Raytheon is also part of Thales's team bidding to supply new aircraft carriers to the United Kingdom. In many respects, the establishment of Thales Raytheon Systems Co. is a more significant development in transatlantic defence industrial relationships than BAE Systems' acquisitions of Lockheed Martin's businesses. Whilst UK companies have a history of participation in the US defence market (including through acquisition), the Thales Raytheon joint venture represents a step-change in US-French relationships in the defence industrial field which have traditionally been clouded by suspicions and distrust.

Wholly-owned subsidiaries

Raytheon's principal European wholly-owned subsidiary is its UK-based company Raytheon Systems Ltd, which employs approximately 1,900 people, many as a consequence of the Hughes merger in 1997. Raytheon's capabilities in the UK include the design, development and production of advanced defence electronic systems, such as global positioning systems, battlefield communications systems, power devices, integrated electronic systems, identification systems and radar systems. Indeed, under the company's reorganisation plans, the company's Glenrothes plant in Scotland will be the only manufacturer of control systems for Raytheon's Amraam missiles.

7.4 Acquisitions and divestments involving European companies

Table 7.4 (page 58) shows that Raytheon has been involved in few transatlantic acquisitions and divestments. Both of the deals identified involved naval and maritime systems. In 1995, Raytheon acquired Anschutz & Co., a German manufacturer of integrated bridge systems. In December 1998, as part of Raytheon's effort to reduce its debt level, the company sold its sonobuoy business to Ultra Electronics. Ultra is a UK aerospace and defence electronics group that has built up business positions in the US and Canada primarily through acquisition.

More significant, however, was Raytheon's aborted attempt to acquire UK defence electronics company Racal Electronics which was the subject of speculation during 1999/2000. Raytheon's plans to acquire the defence electronics business of the United Kingdom's Racal came to a stop in large part because of Raytheon's financial and management problems. The failure of Raytheon's bid is significant both because it shows that the company has considered the possibility of a major European acquisition and because it reminds us that the strategic options open to Raytheon (and Lockheed Martin) are likely to be constrained until current management actions to improve the company's financial health begin to bear fruit.

[33] Brooks Tigner, 'Raytheon and Thomson-CSF plan joint venture in radar', *Defense News*, 3 July 2000, pp. 1-18.

Table 7.1: Raytheon - Current European defence programmes (orders and deliveries 1998-2000)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
AIM-120 AMRAAM	United Kingdom	Mi		1994	1998	FMS		
AN/SSQ-32	Spain	El	4		1994-2000	Co-production	Indra (Spain) ENOSA (Raytheon-Indra joint venture)	Sonars for 4 minesweepers. In Feb 2001 it was announced that the Spain has ordered further systems.
AGM-65G/F/D Maverick	Belgium Italy	Mi	N/a	Jan 1997	July 1999	FMS		
AIM-120 AMRAAM	Belgium Greece Netherlands Norway Spain	Mi	276	Jan 1997	Sept 1999	FMS		
AIM-120 AMRAAM	Italy Greece	Mi	33 90	Requested Dec 1997		FMS		
Spanish F-100 frigate programme	Spain	Sh	4	1998		Sub-contractor	Bazan	Supplying sonar system
AIM-120 B/C AMRAAM	Spain	Mi	100	1998		FMS		
AIM-120 AMRAAM	Greece Italy	Mi	90 33	April 1998	July 2000	FMS		
Harpoon missiles	Greece	Mi	32	Requested December 1998		FMS	Offset expected	For Greek KIDD class guided missile destroyer order
MK 46 MOD 5 torpedoes	Greece	Mi	48	Requested December 1998		FMS	Offset expected	For Greek KIDD class guided missile destroyer order

Table 7.1: Raytheon - Current European defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
HAWK missile system engineering services	Netherlands Spain Sweden	Mi/Oth		Feb 1999	Dec 2000	FMS		Engineering services for installed systems
ECR-90 radars for Eurofighter		El	147	Feb 1999		Teaming	Team led by BAE Systems (UK) FIAR (IT) ENOSA (SP)	
AIM-120 AMRAAM	Spain Italy	Mi	100 60	March 1999	July 2001	FMS		
UGM-109 TOMAHAWK BLOCK IIIC Land Attack Missiles (TLAMs)	United Kingdom	MI	30	April 1999		FMS		$100m contract
NATO Air Command and Control System (ACCS)	NATO	El	$800m	July 1999		Direct sale	Air Command Systems International (Raytheon-Thales joint venture)	Phase I worth $800m – total programme worth $8,000m
AGM-65 Maverick	Italy	Mi	N/a	Aug 1999		FMS		
Javelin	Spain	Mi	12 systems worth $25m	Aug 1999		FMS		
45 T-6A Texan 2 joint training aircraft	Greece	Ai	$238m contract for 45	Aug 1999	2000-2003	Direct sale		
Paveway II/III	France	SA/O	$100m	Nov 1999	2000	FMS		

Table 7.1: Raytheon - Current European defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
ASTOR	United Kingdom	El	$1,300m	Dec 1999		Teaming	Bombardier Short Brothers (UK) Motorola UK Ultra Electronics (UK) Marshalls (UK)	
Phalanx CIWS support contract	Spain United Kingdom	SA/O		Feb 2000	Jan 2005	FMS		Support contract for installed Phalanx systems
AGM-88 HARM	Germany	Mi	250	March 2000		Teaming	BGT (Germany)	BGT provides local support
AV-8B Harrier	Spain	Ac/El	2 (+ option on 7)	May 2000	2003+	FMS	Boeing (US) Rolls-Royce (UK) BAE Systems (UK)	Raytheon providing AN/APG-65 radar in programme to remanufacture to Harrier II Plus configuration
SM-2 Standard missile	Spain The Netherlands Germany	Mi	89	May 2000	Dec 2003	FMS		Contract includes undisclosed number being sold to Japan
F-16 MMC Phase III	Belgium Denmark Norway	El		March 2000	Dec 2004	FMS		
AV-8B Harrier	Spain	El	2 (+ option on 7)	May 2000	2003+	FMS	Boeing (US) Rolls-Royce (UK) BAE Systems (UK)	AN/APG-65 radar as part of remanufacturing to Harrier II Plus configuration
AIM-120 AMRAAM	Greece	Mi	560	Requested May 2000		FMS	Offset requested	

Table 7.1: Raytheon - Current European defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
AIM-120 B/C	United Kingdom	Mi		2000		FMS		Interim until delivery of Meteor
NASAMS	Spain	El/Mi	4 worth $82m	July 2000		Direct sale	Teaming with Kongsberg Defence & Aerospace (Norway)	Raytheon supplying AN/MPQ-63D radar & AMRAAM as part of Norwegian Advanced Surface-to-Air Missile System
SM-2 Standard missiles	Italy	Mi	50 worth $135m	Requested July 2000		FMS	50% offset likely	
RIM-116 Rolling Airframe Missiles (RAM)	Greece	Mi	N/a				Lead contractor RAMSYS (Germany)	
Harpoon	Germany Greece Denmark Netherlands Spain United Kingdom	Mi		August 2000		FMS		Sale of spares
AN/APS-137B(V)5 radar	Netherlands	El	11	Sept 2000	Dec 2002	FMS		For P-3 aircraft programme
AGM-65G2 Maverick	United Kingdom	Mi	$59.7m	Sept 2000		FMS		
CEC Phase I study	United Kingdom	El		Oct 2000		Direct sale		
Successor Identification Friend or Foe	United Kingdom	El	$148m	Dec 2000		Teaming	GKN Westland Helicopters (UK) Marshall Aerospace (UK) BAE Systems (UK)	

Table 7.1: Raytheon - Current European defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
Enhanced Paveway III	United Kingdom	SA/O	$33.2m	Jan 2001		FMS	Portsmouth Aviation Ltd (UK) MBM technology (UK) Thomson-Thorn Missile Electronics (France/UK) SEI (Italy)	
Stinger	United Kingdom Greece Italy	Mi	Total of 1007	Jan 2001	Jan 2004	FMS		
Airbus A310 MRTT	Germany	Ai	4	Jan 2001		Teaming	Airbus	Multi-role tanker transport
Patriot PAC-3	Germany Greece The Netherlands							German version to be co-developed by LM_EADS jv The Netherlands has requested PAC-3
Stinger	Germany	Mi				Licensed production	LFK/EADS (Germany)	
UK Type 45 destroyer	United Kingdom	El		March 2001		Direct sale		Supplying integrated navigation system

Table 7.2: Raytheon - Potential future programmes

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
Future Strategic Tanker Aircraft	United Kingdom	Ai	Teaming	BAE Systems/Airbus	30-year contract worth $13.5bn
NATO Theatre Ballistic Missile Defence (TBMD)	NATO	Mi	Teaming	Thales Raytheon Systems (FR/US) EADS (GER) Hollandse Signaalapparaten (NL) Dassault Aviation (FR) Hunting Defence (UK) Indra (SP) BGT (GER) Info data (Italy) Elfon (Greece)	
Bowman	United Kingdom	El			Nov 2000 - Raytheon did not receive invitation to tender but is offering its services on the $2,500m programme
Cooperative Engagement Capability	United Kingdom	El	FMS	Raytheon Systems Ltd (UK)	Assessment Phase – bidding against *Lockheed Martin*
UK Future Aircraft Carrier (CVF)	United Kingdom	Sh	Teaming	Thales (France) BMT Defence Services (UK) Lockheed Martin	Programme assessment phase

Table 7.2: Raytheon - Potential future programmes (cont.)

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
SEA RAM	United Kingdom	Mi	Teaming		Private venture by Raytheon with UK Royal Navy as potential launch customer – currently testing

Table 7.3: Raytheon - European alliances, joint ventures and wholly-owned subsidiaries

Name	Type of relationship	European partner(s)	Sector	Comments
Raytheon/Airbus	Strategic alliance	Airbus	Ac;El	Raytheon has an exclusive arrangement with Airbus to use its platforms for AEW & tankers
Raytheon/BGT	Strategic alliance	BGT (Germany)	Mi	
ENOSA	Joint venture	Indra Dtd (Spain) (51%)	El; Mi	Spanish manufacturer of electro-optics, missiles & weapon control systems.
Indra-Raytheon	Joint venture	Indra Sistemas (Spain) (51%)	El	Spanish developer of ATC systems
Air Command Systems International	Joint venture	Thales (France)	El	To provide Air Command & Control System Level of Capability 1 (ACCS LOC1) to NATO
Thales Raytheon Systems Co	Joint venture	Thales (France)	El	Equally-owned joint venture focused on air defence command & control and ground-based radar
ELCAN Optical Technologies	Wholly-owned subsidiary	--------	El	Spanish subsidiary
Raytheon Anschultz	Wholly-owned subsidiary	--------	El	German-based manufacturer of integrated bridge navigation systems
Raytheon Microelectronics Espana	Wholly-owned subsidiary	--------	El	Spanish subsidiary
Raytheon Systems Ltd	Wholly-owned subsidiary	--------	El; Mi	Umbrella company for Raytheon operations in the UK, employing more than 1,000 people. Services.

Table 7.4: Raytheon - Acquisitions and divestments involving European companies

Year	Transaction	European company involved	Sector	Comment
1995	Acquisition	Anschutz & Co (Germany)	El	Manufacturer of integrated bridge systems
December 1998	Divestment of sonobuoy business	Ultra Electronics (Holdings) PLC	El	Deal worth $21.6. Ultra Electronics is a UK-based aerospace and defense electronics group with operations in the UK, Canada, and the US

8. Litton Industries

Litton Industries has a number of European defence-related manufacturing facilities as well as established experience of international business activities in the defence field. Litton is positioned on European programmes through:

- Being designed-in to US systems that are then the subject of FMS
- As a supplier to European programmes through its European subsidiaries
- Some FMS of its own systems.

Litton's European activities come through its advanced electronics activities. Whilst its Ingalls shipyard has sought European orders it has had little success in this market to date.

8.1 Current European defence programmes (orders and deliveries 1998-2000)

Litton's participation in current European programmes is set out in Table 8.1 (pages 61-62):

- *EF2000 Eurofighter* – Litton estimates that each EF2000 Eurofighter contains Litton avionics worth around $1 million. Much of this comes from programme participation by Litton's European subsidiaries LITEF and TELDIX.
- *Radar* – a UK subsidiary, Litton Marine Systems, has sold navigation radars to the UK and French navies.
- *Inertial navigation* – Litton's LN-100G inertial navigation system is used in the F/A-18 (Spain), SH-60B LAMPS helicopters (Spain and Greece), Tomahawk cruise missile (UK), Sweden's Puma helicopter, UK Sea Harriers, Spanish C-130s and is being used in the Tornado upgrade for Germany, United Kingdom and Italy. Spain has purchased Litton's AN/WSN-7 ring laser gyros.
- *Electronic warfare* – AN/ALR-67B(V)2 countermeasures receivers are installed in the Spanish F/A-18s, AN/APR 39A(VE)(V)3 radar warning receivers have been sold to Norway and Litton is working with EADS/DASA (Germany) to supply radar warning receivers to the German Tornado upgrades.
- *Litton Ingalls* – is the prime contractor for two Dutch-designed diesel electric submarines for the Egyptian Navy that are being produced with the collaboration of Dutch company RDM Submarines.

8.2 Potential future programmes

The databases and other sources that we used revealed rather few potential future programmes for Litton. These are set out in Table 8.2 (page 63) but are likely to understate the extent of Litton's forward sales given that many of those sales are related to the sale of platforms by other US companies through the FMS programme. Important future programmes include:

- *The UK's Battle Group Thermal Imaging programme* where Litton is seeking to supply its thermal imaging equipment in a team led by the UK's Hunting Engineering.
- *IRIS-T missile system* – Litton Italia is acting as a subcontractor to prime contractor BGT on this air-to-air missile programme.

- *On-going efforts by Litton Ingalls* to supply combatants to European customers (as well as customers in the Middle east and Pacific Rim). Ingalls' family of international combatant ship designs includes a 203-foot Multimission Missile Boat, a 203-foot Customs Patrol Ship, a 279-foot Customs Patrol Ship, a 279-foot Corvette, a 420-foot Frigate, and a 492-foot Multipurpose Amphibious Ship.

8.3 European alliances, joint ventures and wholly-owned subsidiaries

Through wholly-owned subsidiaries, Litton has a manufacturing presence in Germany, Italy and the UK. LITEF (Germany) and LITAL (Italy) are long established companies created as part of offset deals more than 30 years ago. In addition, German wholly-owned subsidiary TELDIX manufactures head-up displays and computer systems for military aircraft (including Tornado and Eurofighter) as well as space systems. Litton Marine Systems (UK) manufactures radar and marine electronic equipment company.

8.4 Acquisitions and divestments involving European companies

Litton has made a number of European Litton acquired the German company TELDIX in 1996 that manufactures head-up displays and computer systems for military aircraft (including Tornado and Eurofighter) as well as space systems. Similarly, in 1997 Litton acquired Racal Marine a UK radar and marine electronic equipment company and TEC Electrical Components in 1999.

Litton also sold a semiconductor business to Filtronic of the UK.

Table 8.1: Litton - Current European defence programmes (orders and deliveries 1998-2000)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
Eurofighter	United Kingdom Germany Italy Spain(?) ???	Ai	Direct sale		Value of Litton avionics estimated to be $1 million per aircraft			
Tornado upgrade	Germany United Kingdom Italy	El	$500m	1997	1999+	Direct sale	LITEF (GER)	LITEF using Litton's LN-100G navigation system supplied by Litton Guidance & Control Systems (US)
Tornado upgrade	Germany	Ai/El	$50-100m	1997	Order still pending	Direct sale	EADS/DASA (GER)	Litton Applied Technology (US) working with DASA to supply radar warning system
AN/APR-39A(VE)(V)3 radar warning receivers	Norway	El	$3m	1997	1998+	Direct sale		Upgrade to existing system on Bell 412 helicopters
F/A-18	Spain	El		Nov 1997	1998+	FMS		AN/ALR-67B(V)2 countermeasures receiving sets
Norwegian Hellfire Shore Defense System	Norway	El	$12m	Dec 1997	Dec 1998	Direct sale		Upgrade to established system

Table 8.1: Litton - Current European defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
AN/WSN-7 Ring Laser Gyro Navigators	Spain	EI	$15.6m	Feb 1998		FMS		
IRIS-T development contract	Germany Italy Greece Norway Sweden	Mi	$284.2m	May 1998	Nov 2002	Subcontractor	BGT (Germany) Raufoss (NO) Saab Dynamics (SW) Fiat Avio (IT) Pyrkal (GR)	Litton Italia acting as subcontractor to BGT
BridgeMaster navigation radars	France	EI	$2.2m	April 1999	2002	Direct sale		42 French Navy ships being retrofitted by Litton Marine Systems (UK)
AN/PVS-7B night vision goggles	Greece	EI	N/a	May 1999		FMS		
BridgeMaster navigation radars	United Kingdom	EI		March 2000	June 2000		Litton Marine Systems (UK)	Systems for 19 Royal Navy & British Army ships
SM-2 Standard missiles	Italy	Mi	50 worth $135m	Requested July 2000		FMS	50% offset likely	Litton Marine Systems (US)
Future Escort R&D programme	United Kingdom	EI	$21.3m	Jan 2001			Litton Marine Systems (UK)	Prototype three-hulled warship being produced by Vosper Thornycroft (UK) – LMS has total systems responsibility for vessel's electronics package
Type 45 destroyers	United Kingdom	EI		March 2001			Litton Marine Systems (UK)	Platform Management System
Tiger helicopter		EI					LITEF	

Table 8.2: Litton - Potential future programmes

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
UK Battle Group Thermal Imaging	United Kingdom	El		Hunting Engineering (UK) BAE Systems (UK) GIAT Industries (FR)	Litton Technische GmbH (LITEF) member of Hunting's "Team Viper"
IRIS-T missile	Germany Italy Greece Norway Sweden	Mi	Subcontractor	BGT (Germany) Raufoss (NO) Saab Dynamics (SW) Fiat Avio (IT) Pyrkal (GR)	Litton Italia acting as subcontractor to BGT

Table 8.3: Litton - European alliances, joint ventures and wholly-owned subsidiaries

Name	Type of relationship	European partner(s)	Sector	Comments
Dutch Moray-class submarine for Egyptian Navy	Alliance	RDM Submarines (NL)	Sh	Ingalls prime contractor for two Dutch-designed diesel-electric submarines for Egyptian Navy worth $750m. Order began Oct 2000.
LITEF	Wholly-owned subsidiary		El	German company manufacturing airborne, marine & land navigation systems. Contracts include TIGER helo, F-4, Tornado & Eurofighter
TELDIX	Wholly-owned subsidiary		El	German company manufacturing avionics & navigation systems. Contracts include Eurofighter
LITAL	Wholly-owned subsidiary		El	Italian company
Litton Marine Systems	Wholly-owned subsidiary		El	UK manufacturer of radar & marine electronic equipment
C Plath	Wholly-owned subsidiary		El	German supplier of maritime steering & navigation systems

Table 8.4: Litton - Acquisitions and divestment involving European companies

Year	Transaction	European company involved	Sector	Comment
February 1996	Acquisition	Teldix (Germany)	El	Acquisition for an undisclosed sum of German manufacturer of avionics & navigation systems.
March 1997	Acquisition	Racal Marine	El	$49m acquisition of UK manufacturer of radar and navigation systems.
August 1998	Divestment	Filtronic PLC (UK)	El	$43m disposal of manufacturer of semiconductors used in commercial wireless communications systems, automotive electronics, and in military and commercial space systems.
October 1999	Acquisition	TEC Electrical Components Group Ltd. (UK)	El	$8.6m acquisition of manufacturer and supplier of electrical connectors to the military, aerospace and commercial industries.

9. Northrop Grumman

Northrop Grumman has established itself in the European defence market through Foreign Military Sales and wholly-owned subsidiaries. The company is seeking to expand that presence and its growing alliance with EADS is worthy of particular note.

9.1 Current European defence programmes (orders and deliveries 1998-2000)

Northrop-Grumman's participation in current European programmes is set out in Table 9.1 (pages 68-69). Noteworthy programmes include:

- *Military aircraft* – Northrop Grumman has supplied E2-C Hawkeyes to France and – as a major subcontractor – benefited from the sales of the F/A-18 to Spain and the lease of C-17s to the United Kingdom.
- *Electronic warfare* – Northrop Grumman is supplying the AN/ALQ-131 system to Norway as part of the upgrade of its F-16 aircraft.
- *Fire control systems* – Longbow FCR to the UK and the Netherlands as part of the sale of the AH-64 Apache. ATACMS to Greece.
- *Sensors* – Northrop Grumman supplies the AN/AAR-54(V) radar for the German C-160 transport aircraft.
- *Marine* – teamed with Rolls-Royce, Northrop Grumman is developing and supplying the WR-21 gas turbine for the UK Royal Navy's Type-45 destroyer programme.

9.2 Potential future programmes

Northrop Grumman has an interest in a number of potential future programmes and these are listed in Table 9.2 (pages 70-71). In particular, it is worth noting:

- *Military aircraft/UAVs* – The Joint Strike Fighter is an important programme for Northrop Grumman as a member of the Lockheed Martin team. In addition, Northrop Grumman is potentially strong placed to benefit from future European UAV programmes. The UK Watchtower UAV programme is currently in the assessment phase and Northrop Grumman is teamed with UK companies Smiths Industries and Ultra Electronics for this programme. Also, Northrop Grumman is supplying synthetic aperture radars for the Italian Predator requirement. Northrop Grumman has also positioned itself for future European and NATO requirements through a Memorandum of Understanding signed with EADS in July 2000 to cooperate on HALE UAV development.
- *Sensors* – Northrop Grumman has teamed with EADS to bid for the NATO Alliance Ground Surveillance requirement and to offer Northrop Grumman's AN/APN-241E weather and navigation radar for the Airbus A400-M. Northrop Grumman is also teamed with Raytheon on the Multi-Platform Radar Technology Insertion programme being offered for the NATO Transatlantic Advanced Radar platform. In addition, Northrop Grumman is teamed with Lockheed Martin and a number of European companies on the Sonar 2087 for the UK Royal Navy's Type 23 frigate. Babcock Defence Systems is the prime on this programme.
- *Marine* – the WR-21 marine gas turbine being co-developed by Northrop Grumman and Rolls-Royce (UK) with DCN (France) as a marketing partner

has been selected for the UK Royal Navy's Type 45 destroyer programme and has the potential for sales to the French Navy and US Navy.

9.3 European alliances, joint ventures and wholly-owned subsidiaries

Northrop Grumman's footprint in Europe is described in Table 9.3 (page 72) and the emerging relationship between Northrop Grumman and EADS is worthy of particular note.

Strategic alliances with EADS

2000 saw the evolution of Northrop Grumman's position in Europe towards an emerging relationship with EADS. The relationship has evolved out of long standing business linkages DASA of Germany (a part of the new EADS). In 2000, Northrop Grumman and EADS announced two strategic alliances. In July 2000, they signed a Memorandum of Understanding to cooperate on the high altitude long-endurance unmanned aerial vehicle (HALE UAV) and, in a separate agreement, they have established a strategic relationship to offer Northrop Grumman's AN/APN-241 weather and navigation radar for the Airbus A400M military transport aircraft programme. In addition, the two companies are working together to promote Northrop Grumman's Platform Radar Technology Insertion Programme (RTIP) for the NATO Air Ground Surveillance programme.

Wholly-owned subsidiaries

Whilst we were unable to identify any joint ventures, Northrop Grumman does have a number of wholly-owned subsidiaries including UK-based Northrop Electronics Systems International which is responsible for the DIRCM programme in the UK, two companies in the air traffic control equipment sector (Navia Aviation of Norway and Park Air Electronics in the UK) and INRI UK, a subsidiary that develops C4I software originating in the US.

9.4 Acquisitions and divestments involving European companies

Table 9.4 (page 73) notes that Northrop Grumman made two European acquisitions in 2000. The acquisition of Navia Aviation in Norway broadened the company's position in commercial and military ATC systems and the acquisition of Alvis Logistics (UK) complemented Northrop Grumman's existing capabilities in explosive ordnance handling and disposal.

We identified one divestment of a Northrop Grumman business to a European company. In 1995, Northrop Grumman sold certain gyro manufacturing operations to Meggitt of the UK.

Table 9.1: Northrop Grumman - Current European defence programmes (orders and deliveries 1998-2000)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
AN/AAQ-24(V) DIRCM	United Kingdom	El	$271 million	1995	1997+	Teaming	BAE Systems	Directed Infrared Countermeasures system installed on ten different UK aircraft
ATACMS	Greece	Mi	81	1996	1998	FMS		With Lockheed Martin
E2-C	France	Ai/El	3	1994	1999	FMS	Potez (France) Thales (France)	For use on Charles De Gaulle nuclear powered aircraft carrier
Longbow FCR	United Kingdom	El		1998	2002	Teaming	BAE Systems (UK)	For British Army's Apache attack helicopters
C4I technical support to Italian Navy	Italy	Oth		Sept 1998	Sept 1999	FMS		Logicon Tactical Systems
Submarine Acoustic Warfare Control System	United Kingdom	El	$15.4m	March 1999		Subcontractor	Alenia Marconi Systems	Subsystem supplier
AN/ALQ-131 ECM system	Norway	El	16	May 1999	May 2001	FMS		Upgrade to Block II
AEGIS software	Spain	El		Sep 1999	Sep 2000	FMS		Test & evaluation of AEGIS combat system & software

Table 9.1: Northrop Grumman - Current European defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
APG-78 Longbow FCR	Netherlands	El	30 worth $225m	Requested Nov 1999		FMS		
AN/ALQ-162 ECM system	Denmark Norway	El	4 units 29 units	May 2000		FMS		
C-160 transport aircraft	Germany	El		July 2000	March 2001	Supplier		AN/AAR-54(V) radar selected
AV-8B	Italy Spain	El	4 2	July 2000		Supplier		Litening II targeting pods
Trident D5	United Kingdom	Mi	$45.4m	Dec 2000	April 2003	Supplier		Back fit support for launcher subsystem for Royal Navy & US Navy
Type-45 destroyer	United Kingdom	Sh	12 engines for $121.7m	March 2001		Co-development	Rolls-Royce	WR-21 advanced cycle gas turbine

Table 9.2: Northrop Grumman - Potential future programmes

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
Joint Strike Fighter	United Kingdom (full partner) Denmark, Norway, The Netherlands (associated partners) Italy (informal partner)	Ai	Co-development	BAE Systems (UK) Rolls-Royce (UK) Fokker (Netherlands) Airbus Industrie (Europe) National Aerospace Laboratory (Netherlands)	Concept demonstrator Northrop Grumman is part of the Lockheed Martin team
NATO Theatre Ballistic Missile Defence (TBMD)	NATO	Mi		EADS Missiles (FR) EADS Defence Electronics (GER) Alenia Aerospazio (IT)	Consortium established to bid for one of two feasibility studies expected to be let in May 2001
Predator	Italy	Ac/El	Sub-contractor to General Atomics (US)	Meteor (Italy)	AN/ZPQ-1 synthetic aperture radar for 6 UAVs.
UK Watchtower UAV	United Kingdom	Ai/El	Teaming	Smiths Industries (UK) Ultra Electronics (UK)	Assessment phase began 2000
NATO Alliance Ground Surveillance	NATO	Ai/El	Teaming	EADS	Agreement to cooperate on integration of Airbus aircraft with Northrop Grumman's RTIP

Table 9.2: Northrop Grumman - Potential future programmes (cont.)

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
NATO Transatlantic Advanced Radar Platform	NATO	EI	Teaming		Multi-Platform Radar Technology Insertion program (teamed with Raytheon) being offered for NATAR
Sonar 2087	United Kingdom	EI	Teaming	Babcock Defence Systems (UK prime) Cogent (UK) BMT (UK) STN Atlas Elektronik (Germany) Ultra Electronics (UK) Lockheed Martin (US)	ASW system for British Royal Navy's Type 23 frigate (currently at assessment phase).
WR-21	France United Kingdom	Eng	Co-development	Rolls-Royce DCN	Intercooled recuperated marine gas turbine being developed for US Navy, British Royal Navy & French Navy
AN/APN-241E for Airbus A400-M	France Germany United Kingdom Italy Turkey Spain Belgium Portugal	EI	Co-development & licensing	EADS	A Memorandum of Understanding was signed by the companies in 2000 for the production and support of the Northrop Grumman AN/APN-241E weather and navigation radar.

Table 9.3: Northrop Grumman - European alliances, joint ventures and wholly-owned subsidiaries

Name	Type of relationship	European partner(s)	Sector	Comments
High-altitude, long-endurance unmanned aerial vehicle (HALE UAV)	Strategic alliance	EADS	Ai/El	Memorandum of Understanding to cooperate on HALE UAV signed July 2000
AN/APN-241 weather and navigation radar project	Strategic alliance	EADS	El	Will be offered for the A400M military transport aircraft
Alvis Logistics	Wholly-owned subsidiary		Oth	UK-based explosive ordnance disposal business of Alvis Plc acquired in 2000
INRI UK Ltd	Wholly-owned subsidiary		El	
Park Air Electronics Ltd	Wholly-owned subsidiary		El	Supplier of air traffic control systems for commercial aviation
Navia Aviation AS (Norway)	Wholly-owned subsidiary		El	Supplier of instrument landing systems, digital voice switching systems and air traffic control systems for commercial aviation
Northrop Electronics Systems International Inc.	Wholly-owned subsidiary		El	The entity responsible for performing the AN/AAQ-24(V) directed infrared countermeasures (DIRCM) program in Britain.
INRI UK Ltd	Wholly-owned subsidiary		El	Established in 1992, the company develops COTS C4I systems based on software and software architectures developed in the US by its parent company.

Table 9.4: Northrop Grumman - Acquisitions and divestment involving European companies

Year	Transaction	European company involved	Sector	Comment
December 1995	Divestment	Meggitt Holdings PLC	Oth	Divestment of the micro-machined silicon accelerometer and micro-machined accelerometer gyro manufacturing operations of Northrop Grumman Corp.
2000	Acquisition	Alvis Logistics Ltd (UK)	Oth	Acquisition of UK-based explosive ordnance disposal business of Alvis Plc for approximately $2.2 million (US).
2000	Acquisition	Navia Aviation AS (Norway)	El	Acquisition for US$35 million of Norwegian-based supplier of instrument landing systems, digital voice switching systems and air traffic control systems for commercial aviation

10. Textron

Textron has a very limited exposure to the European defence market. Historically, Bell Helicopter has made major sales of military helicopters to Europe. However, we could find no records of new orders or deliveries during the 1998-2000 study period although there are likely to have been sales of spares and engineering support during the period and Bell Helicopter also bid – unsuccessfully – on two major programmes in the recent past.[34] Bell Helicopter and other Textron businesses are bidding on a number of forthcoming potential European programmes.

10.1 Current European defence programmes (orders and deliveries 1998-2000)

Table 10.1 (page 76) shows that Textron had a very limited exposure to the European defence market during the study period:

- Through its UK-based wholly-owned subsidiary *David Brown Defence Equipment (DBDE),* Textron has responsibility for all British tracked armoured vehicle transmissions except the Perkins Engines X-300-5 series made for the GKN Defence Warrior and Swedish CV 90 series vehicles. DBDE is the builder of the TN54 transmission for the Challenger 2 main battle tank and the Challenger Armoured Repair and Recovery Vehicle.
- *Textron's sale of mobile microwave landing systems to Italy* is the only European contract identified for the study period.
- To the best of our knowledge, *Bell Helicopter* had no new orders or deliveries during the study period. Bell Helicopter competed for the Nordic Standard Helicopter programme but was unsuccessful during the down-select. Similarly, Bell Helicopter bid for the UK's attack helicopter programme teamed with the then GEC Marconi (UK): offering AH-1 "Cobra Venom" gunship, featuring four-bladed AH-1 upgrade by Bell, with avionics upgrade by GEC. That programme was won by a team of (then) McDonnell Douglas Helicopter Systems (now Boeing) and GKN Westland Helicopters Ltd. (now Agusta Westland) offering the AH-64D Apache attack helicopter.

10.2 Potential future programmes

Table 10.2 (page 77) identifies a number of potential future European programmes where Textron has an interest. These include:

- *Helicopters* – Bell Boeing is offering the V-22 Osprey to meet the UK Royal Navy and Air Force requirement for a replacement for more than 100 helicopters. Bell Boeing appears likely to offer licensed production of the V-22 teamed with either BAE Systems or Agusta Westland.
- *UAVs* – Bell is teamed with BAE Systems, General Atomics and Flight Refuelling in a bid for the UK's Watchtower UAV based on Bell Textron's Eagle Eye UAV.
- *Munitions* – Textron's XM93 Wide Area Munition is expected to win the UK competition for an Area Defence Weapon.

[34] Whilst Bell Helicopter may have had little success in the European countries we have studied, it ought to be noted that its AH-1Z King Cobra was selected by Turkey. The programme – for 145 helicopters – has been valued at $4 billion, although the weakening Turkish economy means that there is speculation that the programme may be scaled back.

- *Through its UK subsidiary DBDE* – Textron is a supplier of transmissions for the Challenger IIE being offered by Vickers Defence in the Greek main battle tank competition.

10.3 European alliances, joint ventures and wholly-owned subsidiaries

Table 10.3 (page 78) shows that Textron has a limited European footprint. The wholly-owned subsidiary David Brown Defence Equipment gives Textron an important interest on almost all UK tracked vehicles as a supplier of transmissions. Bell Helicopters joint venture with Agusta Westland – Bell Agusta Helicopter Co. is developing and marketing the Bell Boeing V-22 for European markets.

10.4 Acquisitions and divestments involving European companies

Textron's 1998 acquisition of David Brown Group of the UK included David Brown Defence Equipment and this – as has been noted – has given Textron an interest in UK tracked vehicle production.

Table 10.1: Textron - Current European defence programmes (orders and deliveries 1998-2000)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
Mobile Microwave Landing Systems	Italy	EI	5	1998	1999	Direct sale		
Challenger II main battle tank	United Kingdom & exports to Saudi Arabia	MV	386	1993	1998	Supplier		Transmissions produced by Textron's UK-based DBDE subsidiary.

Table 10.2: Textron - Potential future programmes

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
Area Defence Weapon	United Kingdom	SA/O	Teaming	BAE Systems Royal Ordnance (UK) Hunting Engineering Ltd (UK)	Competitive Evaluation Phase offering Textron's XM93 Wide Area Munition (Hornet),
Watchtower UAV	United Kingdom	Ai/El	Teaming	BAE Systems (UK) General Atomics (US) Flight Refuelling (UK)	Assessment phase began 2000 – bid based on Bell Textron's Eagle Eye UAV
UK Support, Amphibious & Battlefield Rotorcraft	United Kingdom	Hel	Licensed production?	BAE Systems or Augusta Westland?	Offering V-22 Osprey as replacement of more than 100 helicopters for UK Royal Navy & Royal Air Force
Greek main battle tank	Greece	MV	Supplier	Vickers Defence Systems (UK)	Textron UK-based subsidiary DBDE supplier of transmissions for Challenger IIE

Table 10.3: Textron - European alliances, joint ventures and wholly-owned subsidiaries

Name	Type of relationship	European partner(s)	Sector	Comments
Bell Agusta Aircraft Company	Joint venture	Agusta Westland (UK/Italy)	Hel	To develop & market Bell Agusta BA609 Tilt Rotor and Bell Boeing V-22
David Brown Defence Equipment (DBDE)	Wholly-owned subsidiary		MV	UK-based business producing transmissions for tracked armoured vehicles, final drives, test drives, gears and gear-related products, test rigs, and test equipment. The company also performs overhaul and upgrade work on transmissions and drive systems.

Table 10.4: Textron - Acquisitions and divestments involving European companies

Year	Transaction	European company involved	Sector	Comment
October 1998	Acquisition	David Brown Group plc (UK)	MV	Deal worth $326 million (£233 million), plus the assumption of debt. Included in the acquisition was David Brown Defence Equipment (DBDE).

11. General Electric

General Electric has a strong position in the European market through a combination of FMS sales, direct participation in certain European programmes and a major joint venture - CFM International – that produces turbofan engines for narrow body commercial air transports and some military aircraft.

11.1 Current European defence programmes (orders and deliveries 1998-2000)

Table 11.1 (page 81) shows that General Electric has a strong position in the European market both as a consequence of being designed-in to US aircraft subsequently sold to Europe and also through the co-development of engines with European partners:

- *Foreign Military Sales* – General Electric has benefited from the sale of F-16s, the F/A-18 to Spain and SH-70B Seahawks to Spain and Greece.
- *Co-development* – General Electric has successfully collaborated in the co-development of engines for European programmes. GE co-developed the RM12 engine for the Saab/BAE Systems Gripen in collaboration with Sweden's Volvo Aero and based on GE F404 engine. GE has collaborate with Fiat Avio in the co-development of a variant of the T700-GE-701C that will power the Italian Navy's NH-90 helicopters. The C-27J transport aircraft being developed by the Lockheed Martin Alenia Tactical Transport Systems is also powered by a GE engine.

11.2 Potential future programmes

Table 11.2 (page 82) notes that General Electric has an interest in a number of potential future programmes.

- GE is collaborating with Rolls-Royce to produce the F120 engine for the Joint Strike Fighter.
- CFM International is bidding for the contract to re-engine NATO's E3A Sentry aircraft.
- CFM International's CF6-80C2 is one of the engines available to power the Airbus Multi Role Tanker Transport aircraft.

11.3 European alliances, joint ventures and wholly-owned subsidiaries

CFM International is a major joint venture between General Electric and Snecma of France that produces turbofan engines for narrow body commercial air transports and some military aircraft. General Electric is also collaborating with Rolls-Royce to produce the F120 engine for the JSF. GE has a 60% share of the programme and Rolls-Royce a 40% share (split between Allison Engine Co. and Rolls-Royce Military Aero Engines, UK).

11.4 Acquisitions and divestments involving European companies

General Electric has been involved in no acquisitions and divestments involving European companies at least in the last ten years.

Table 11.1: General Electric - Current European defence programmes (orders and deliveries 1998-2000)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
F-16								F110-GE-129
AH-64A Apache	Greece	Hel/Eng	8 engines	Requested June 1999		FMS		T-700-GE-701 engines
F/A-18	Spain	Ai/Eng				FMS		F414-GE-400
BAE/Saab Gripen	Sweden	Ai/Eng				Co-development	Volvo Aero (Sweden)	RM12engine supplied by Volvo Aero is a development of the GE F404 engine
NH-90	Italy	Hel/Eng	196 helicopters ordered in $300m contract	June 2000	2004	Co-development	Fiat Avio	For Italian Naval Aviation's planned fleet of 196 NH-90 helicopters
SH-70B Seahawk	Spain	Hel/Eng	Contract for for 6 helicopters			FMS		T700-GE- 701C engines
SH-70B Seahawk	Greece	Hel/Eng	Contract for 2 helicopters			Direct commercial sale		T700-GE- 701C engines

Table 11.2: General Electric - Potential future programmes

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
JSF				Rolls-Royce	GE collaborating with Rolls-Royce to produce F120 engine
NATO E3A re-engining	NATO	Eng		SNECMA (FR)	Bid by CFM International (GE-SNECMA joint venture)
Airbus Industrie MRTT					powered by either General Electric CF6-80C2

Table 11.3: General Electric - European alliances, joint ventures and wholly-owned subsidiaries

Name	Type of relationship	European partner(s)	Sector	Comments
CFM-International	Joint venture	SNECMA (France)	Eng	producing turbofan engines for narrow body commercial air transports and some military aircraft

12. Newport News Shipbuilding

Newport News remains almost entirely focused on its US Navy business. To our knowledge, it has no European contracts nor does it appear to be bidding for European contracts although it is competing for the Turkish Navy's $2 billion plan for co-production of six frigates and is offering its FF-21. The only point of contact between Newport News and the European defence industry appears to be French company CMN's 20% holding in Newport News' operation in Abu Dhabi.

Conceivably, Newport News could bid its FF-21 for European programmes and – if its acquisition by General Dynamics announced in April 2001 were to go ahead – it could conceivably join Bath Iron Works in the AFCON consortium. However, this is purely speculation on our part.

13. United Technologies (Pratt & Whitney, Sikorsky)

United Technologies is positioned on European defence programmes through the activities of Pratt & Whitney, Sikorsky and also its Sundstrand subsidiary. Whilst GE may have succeeded in co-developing engines with European partners, Pratt & Whitney's European sales have been through FMS involving US military aircraft. Sikorsky has successfully sold its SH-70B Seahawk to Spain and Greece in recent years and has been short-listed for the major Nordic Standard Helicopter Programme. Together with potential future programmes involving Pratt & Whitney, such developments have the potential to increase United Technologies' position in Europe.

13.1 Current European defence programmes (orders and deliveries 1998-2000)

Table 13.1 (page 87) illustrates current European defence programmes in which United Technologies has an interest. These include:

- *Pratt & Whitney* - Pratt & Whitney's position in the European defence market is based on FMS contracts for US aircraft. Thus, Pratt & Whitney engines power some European F-16s and in June 2000 were selected by Greece as part of its F-16C/D order. Pratt & Whitney F117 engines power the C-17 aircraft that are to be leased to the United Kingdom.
- *Sikorsky* – has successfully sold SH-60B Seahawks to Spain and Greece.
- *Hamilton Standard/Sundstrand* – this subsidiary of United Technologies has a position on various European aircraft programmes – including the Saab/BAE Systems Gripen – and its Ratier-Figeac subsidiary in France supplies the Eurocopter Super Puma and Tiger helicopters as well as Airbus and Rolls-Royce.

13.2 Potential future programmes

United Technologies has an interest in a number of potential forthcoming programmes and these are listed in Table 13.2 (pages 88-89). Significant programmes include:

- *Pratt & Whitney* – developing the JSF119 engine for the Joint Strike Fighter. Volvo Aero Norge – a joint venture in which Pratt & Whitney has a stake – is also part of the JSF119 programme. In addition, Pratt & Whitney is teamed with Northrop Grumman in a bid for the contract to re-engine NATO's E3A Sentry aircraft and its PW4152 are one power plant for the Airbus Multi-Role Tanker Transport aircraft. Also, Pratt & Whitney would benefit if the UK government were to purchase further C-17 aircraft – an option that the UK Ministry of defence has mentioned if the Airbus A400M does not meet its cost, performance and in-service date targets.
- *Sikorsky* – the sole US company short-listed for the Nordic Standard Helicopter Programme where it is offering the S-92 which would be produced under license by Patria Finavetic (Finland). Saab Military Aircraft (Sweden) is another partner in the bid team. Sikorsky has also made a contingency offer of its S-70B Seahawk in response to Norwegian indications that it might withdraw from the NSHP because of difficulties in agreeing a common requirement. Sikorsky is offering the S-92 for the UK's Support, Amphibious and Battlefield Rotorcraft (SABR) requirement.

13.3 European alliances, joint ventures and wholly-owned subsidiaries

Pratt & Whitney has a modest European footprint and this is described in Table 13.3 (page 89).

- *Volvo Aero Norge* – a Norwegian joint venture between Volvo Aero Corp. (Sweden), Pratt & Whitney and SNECMA (France) that manufactures civil and military aircraft and components and is involved in the JSF119 programme.
- *Licensing* - an on-going agreement with Agusta-Westland.
- *Ratier-Figeac* – a wholly-owned subsidiary that is part of Hamilton Standard and manufactures aviation equipment and components for the commercial and military sectors.

13.4 Acquisitions and divestments involving European companies

In January 2000, the UK *Sunday Times* newspaper ran a story saying that Rolls-Royce was rumoured to be in merger talks with Pratt & Whitney. Such rumours have circulated periodically for a number of years and have been advocated by financial commentators as a way of addressing the market position of General Electric.

United Technologies has acquired a number of European businesses – some as a consequence of its acquisition of Sundstrand. In February 1998, Hamilton Standard acquired Ratier-Figeac of France, in the UK IMI Marston's Heat Transfer and Fluids management business was acquired in March 1999 and Claverham Group was acquired in 2000. United Technologies has also divested certain businesses to European companies. In 1994, it sold its equity stake in the UK helicopter manufacturer Westland to Westland Group (UK). In 1999, it sold Dow-UTC Composites (a joint venture with Dow) to GKN Westland Aerospace of the UK.

Table 13.1: United Technologies - Current European defence programmes (orders and deliveries 1998-2000)

Programme	European country(s) involved	Programme classification	Quantity	Order date	Delivery date	Type of programme	European companies involved	Comments
F-16	Belgium Netherlands Norway	Ac; Eng	110 aircraft	1993	1998	FMS		F100-PW-229 engines
F16C/D Block 50+	Greece	Ac; Eng	£226m ($316.5m)	June 2000		FMS		F100-PW-229 selected to power 50 new F16C/D Block 50+ aircraft
C-17	United Kingdom	Ac; Eng	16 engines worth $100m	2000		Leasing		F117 engines for four C-17 aircraft being leased to UK government
SH-70B Seahawk	Spain	Hel	$77.4 for 6			FMS		Contract includes upgrades to the six SH-60B aircraft already serving the Spanish Navy.
S-70B SEAHAWK	Greece	Hel	$107m contract for 2 & upgrades			Direct commercial sale		Contract includes upgrades to the eight S-70B aircraft already in service with the Hellenic Navy.

Table 13.2: United Technologies - Potential future programmes

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
Nordic Standard Helicopter Program (NSHP)	Finland Sweden Denmark Norway	Hel	Teaming Gamesa in Spain	Patria Finavetic Oy (Finland) would provide helicopter final assembly, test and some completion operations Saab Military Aircraft (Sweden) would provide NSHP systems design and integration.	Offering S-92 in contract to procure 73 helicopters for search-and-rescue, transport and maritime missions.
S-70B Seahawk	Norway	Hel		Sikorsky has made contingency offer of S-70B Seahawk following Norweigian concerns about NSHP	
Boeing JSF				Volvo Aero Norge	JSF119
Airbus Industrie MRTT					PW 4152 engines.
UK Support, Amphibious & Battlefield Rotorcraft	United Kingdom	Hel		Offering S-92 as replacement of more than 100 helicopters for UK Royal Navy & Royal Air Force	
NATO E3A re-engining	NATO	Eng			Team being led by Northrop Grumman

Table 13.2: United Technologies - Potential future programmes (cont.)

Programme	European country(s) involved	Programme classification	Type of programme	European companies involved	Comments
C-17	United Kingdom	Ac; Eng	?	?	Potential that C-17 will be used to fulfil UK's Short Term Strategic Airlifter requirement if the Airbus Military Co. A400M does not result in an acceptable offer.

13.3 European alliances, joint ventures and wholly-owned subsidiaries

Name	Type of relationship	European partner(s)	Sector	Comments
Volvo Aero Norge (Norway)	Joint venture	Volvo Aero Corp. (Sw) (67% Pratt & Whitney (US) (22%) SNECMA (FR) (11%).	Eng	Manufacturer of civil and military aircraft engines and components.
Ratier-Figeac (France)	Wholly-owned subsidiary		Aerospace supplier	Manufactures a wide variety of aviation equipment and components for the commercial, military and regional markets, including propellers, mechanical flight controls, cockpit controls, hydraulic actuators and ballscrews and helicopter rotor components.

13.4 Acquisitions and divestment involving European companies

Year	Transaction	European company involved	Sector	Comment
February 1994	Sale of equity stake	Westland Group PLC	Hel	
February 1998	Acquisition	Ratier-Figeac (France)	Eng	Acquired by Hamilton Standard
January 1999	Divestment	GKN Westland Aerospace	Oth	$62.5m disposal of Dow-UTC Composite Products a maker of airframe structures & engine components
March 1999	Acquisition	IMI Marston's Aerospace Heat Transfer and Fluids Management businesses (UK)	Eng	$26m
December 2000	Acquisition	Claverham Group PLC (UK)	Oth	UTC's Hamilton Sundstrand subsidiary acquired the UK-based manufacturer of hydraulic actuators for an undisclosed sum.

14. European participation in the US defence market

The previous sections of this report have considered the participation of US companies in the European defence market. In the following three sections, we will consider the participation of European companies in the US defence market. We begin with an overview of European company participation in the US defence market and consider the principal drivers of, and barriers to, European participation in the US market. We also provide short profiles of some of the European companies that have an interest in the US market. Sections 15 and 16 contain detailed profiles of the two leading European defence contractors in the US defence market – BAE Systems and Rolls-Royce.

14.1 Key drivers of European interest in the US defence market

European companies have sought to access the US defence market for three main reasons:

- *Market size* – the position of the US as the world's single largest market for defence equipment means that it is inevitable that European companies have considered strategies to access that market.
- *Budget trends* – this is particularly the case given that that the defence procurement budget in the US appears to be rising – whilst defence budgets in Europe remain flat or are continuing to decline.
- *Access to advanced technologies* – at the same time, the US market is attractive given the US government's on-going spending on R&D and procurement in advanced defence systems technologies.

14.2 Barriers to European entry into the US defence market

The US defence market may be attractive to European companies but it has long proved difficult for them to penetrate that market. Sales volumes from Europe to the United States have been consistently low provoking European criticism of a "Fortress America" and a "one-way street" in transatlantic arms sales in which US companies have been able to sell weapons systems to Europe but European companies have effectively been blocked from the US market.[35] Barriers to entry that have often been cited by European companies include:

- "Buy American" regulations that limit the scope for direct sales of European defence equipment to the US market.
- A perceived reluctance on the part of the US military services to consider European solutions to US military requirements or to develop joint transatlantic programmes.
- US controls on technology transfer and export control that make collaboration difficult, not least because any project with a non-US company requires US government approval for data sharing and any weapon system containing US components requires re-export approval from the US government.

[35] For a review of these arguments see, for instance: Jeffrey Becker (2000), op cit in note 3; Gordon Adams 'Fortress America in a changing transatlantic defence market' in Schmitt, B (ed). *Transatlantic Armaments Cooperation*, Chaillot Paper 42 (Institute for Security Studies Western European Union, Paris, 2001).

- The CFIUS (Committee on Foreign Investments in the United States) process is perceived by many European companies as a major bureaucratic hurdle to foreign companies seeking to enter the US defence market through the acquisition of US defence contractors.
- Controls over the operations of US defence contractors under foreign ownership control or influence (FOCI) such as the requirement for special security arrangements (SSAs) or non-voting trusts can also make investments in the US defence market unattractive to overseas investors. Such regulations limit the scope for achieving technological synergies between the non-US parent and its US subsidiary and can cause managerial inefficiencies.
- A political environment in which the US Congress has historically been perceived by European (especially non-UK) companies as hostile to foreign participation in the US defence market.

14.3 Current European participants in the US market

In the US market, barriers to direct sales by foreign companies mean that European companies have often concluded that the only way to gain access to US programmes has been to acquire a US company. In practice, UK companies have almost exclusively executed these acquisitions and non-UK European (and particularly French) contractors have found entry into the US market far more challenging. On the one hand, this is because – until relatively recently – many of their heritage companies were state-owned. On the other hand, this reflects what is perceived as long-standing tensions and suspicions in the US-French relationship.

UK companies that have positions in the US defence market include:

- *BAE Systems* – the acquisition of Lockheed Martin's Control Systems and Aerospace Electronic Systems businesses during 2000 established the UK company as the largest defence contractor in the world and a leading supplier to the US Department of Defense (see Section 15 for a detailed profile of BAE Systems).
- *Rolls-Royce* – plays a significant role in the US defence market through its Allison Aero Engine subsidiary (acquired in 1995) and direct sales by Rolls-Royce Military Aero Engines (UK) to US programmes such as the T-45 and AV-8B (see Section 16 for a detailed profile of Rolls-Royce)
- Smiths Aerospace – one of the world's major suppliers of advanced avionics and mechanical and electrical equipment to the defence and civil aircraft sectors. Through acquisition and direct sales, Smiths has established itself as a leading supplier of aerospace sub-systems and components to the US aerospace industry. Amongst its products are the all-composite propellers on the C-130J Hercules transport and electrical power management systems on the Apache helicopter. Smiths Aerospace also produces gas turbine engine components that are used on every major engine programme in the western world.
- *Meggitt* – an aerospace and electronics supplier that has made a number of US acquisitions in recent years. In the US, Meggitt Avionics specialises in the design and manufacture of innovative solid state displays, sensors and systems for the aerospace and defence sector. Meggitt Defense Systems is the world's leading designer and manufacturer of aerial towed vehicle systems and related equipment for special applications.

- *Ultra Electronics* – a UK-headquartered global leader in sonobuoys and sonobuoy systems with strong market positions in a number of defence electronic businesses. Ultra has made a number of acquisitions in the US – including that of Raytheon's sonobuoy business.

14.4 A focus on BAE Systems and Rolls Royce

These short profiles emphasise that there are a number of UK-owned sub-system suppliers in the US defence industry. The activities of such companies – and their acquisition activity – has generated little or no political comment not least because their relatively small size – and position in the lower-tiers of the supply chain – mean that they have limited visibility. In contrast, two European companies – BAE Systems and Rolls Royce – have established very significant positions as contractors to the US Department of Defense and suppliers of highly sensitive and technologically advanced defence systems. Again, both companies are headquartered in the United Kingdom and the next two sections will provide descriptions of their corporate organisation and strategy and participation in US defence programmes as well as their recent financial performance.

15. BAE Systems

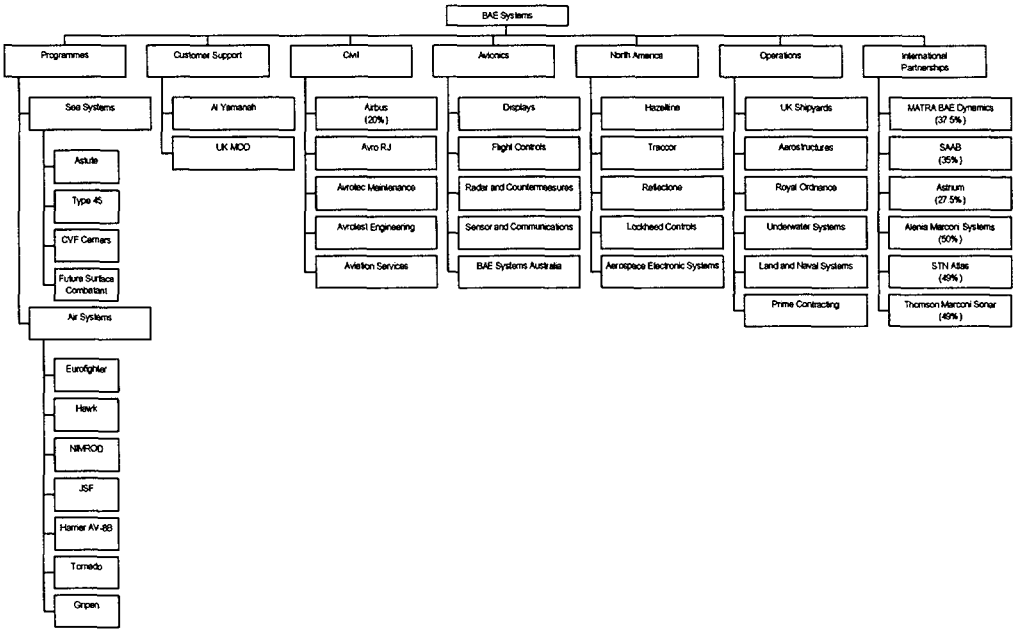
BAE Systems is the largest defence contractor in the world. The product of the 1999 merger between two UK companies – British Aerospace and GEC Marconi Electronic Systems – BAE Systems is multi-national in scope and employs more than 100,000 people in nine countries - the United Kingdom, France, Germany, Sweden, Italy, Australia, Saudi Arabia and the United States. In the United States, BAE Systems is the fifth largest defence contractor with sales exceeding $4 billion and 22,000 employees in 30 states. Indeed, the US Department of Defense is now a larger customer than is the UK Ministry of Defence.

15.1 Corporate organisation

BAE Systems corporate headquarters is at Farnborough in the United Kingdom. Three divisions have an interest in the US market:

- *BAE North America* - comprises all of BAE System's US operations with a separate management structure and trustee boards to comply with US security regulations. BAE Systems North America is a US corporation, subject to US laws and regulations and is cleared by the Department of Defense's Defense Security Service to operate on classified programmes at all security levels through TOP SECRET.
- *Programmes Division* - has responsibility for the T-45 Goshawk, AV-8B and the Joint Strike Fighter programmes and is based in the UK.
- *Avionics Division* - a leading supplier of avionic displays, flight controls and associated sub-systems for the F-16 and F-22 and is based in the UK.

Figure 15.1: BAE Systems Company Organisation



15.2 Corporate strategy

At the heart of BAE Systems' strategy has been the objective of reducing its dependence on any one programme or customer and to become a global company with a breadth of "home" markets. BAE Systems has done this as follows:

- *Diversifying its customer base in defence* – Whilst the old British Aerospace was heavily dependent upon the UK market and the Al Yamamah contract with Saudi Arabia, BAE Systems has sought to diversify its customer base. Recent acquisitions in the United States mean that BAE Systems is more evenly balanced between the US, the UK and the rest of the Europe and the rest of the world. Indeed, it ought to be emphasised that less than 20% of the company's sales are to the UK and the US Department of Defense is now a bigger customer for BAE Systems than is the UK Ministry of Defence.
- *Growing its position in electronics and systems* – BAE Systems has pursued a strategy of vertical integration and has sought to expand its footprint in electronics and systems. The acquisition of GEC Marconi Electronic Systems in 1999 added substantial business in avionics and this has been complemented by the acquisition from Lockheed Martin of two businesses in the United States. The company has stated that its objective is to become a "one-stop shop" for its defence customers.
- *Strengthening its position in naval and land systems* – BAE Systems is also seeking to spread its risks across a range of platforms and the acquisition of GEC Marconi Electronic Systems substantially increased BAE Systems' position as a naval platforms builder.

15.3 Acquisitions and divestments involving US companies

BAE Systems, more than any other US or European company, has pursued a truly transatlantic business strategy. The company has pursued this strategy through a

number of acquisitions involving US companies and these are listed in Table 15.3 (page 99). The key acquisitions have been:

- *GEC Marconi Electronic Systems* - In 1999, British Aerospace's acquisition of GEC's Marconi Electronic Systems provided the company with a bridgehead into the US market, not least because it brought with it GEC's recently acquired Tracor business.
- *Lockheed Martin Control Systems* - In May 2000, the newly established BAE Systems built on this US presence when it announced its $510 million acquisition of Lockheed Martin's Control Systems business. The Control Systems business produced fly-by-wire flight controls, full authority digital engine controls, mission computers and integrated systems combining flight, propulsion and/or weapon control functions. The acquisition not only increased BAE Systems' presence in the US market but boosted its position on the Lockheed Martin Joint Strike Fighter bid (Control Systems produced its vehicle management computer and is conducting related systems integration work) and strengthened the company's existing ties with Boeing (Control Systems was an important supplier to Boeing commercial and military aircraft).
- *Lockheed Martin Aerospace Electronics Systems* - In July 2000, BAE Systems complemented this move when it announced its $1.67 billion acquisition of Lockheed Martin Aerospace Electronics Systems.[36] The acquisition was significant not only because it included within it Lockheed Martin Sanders – the leading company in the electronic warfare market – but it also meant that BAE Systems replaced Lockheed Martin as the largest defence company in the world.[37] Major Aerospace Electronics Systems products included aircraft self-protection systems, tactical surveillance and intelligence systems, reconnaissance and navigation systems, automated mission planning systems, microwave electronics and infrared sensors. The deal increased the turnover of BAE Systems North America by 50% to near $4 billion and further strengthened BAE Systems' position on a range of US programmes – not least the Joint Strike Fighter.

15.4 Current US defence programmes

BAE Systems' participation in US defence programmes is set out in Table 15.4 (pages 100-106):

- *Military aircraft* – BAE Systems co-developed the T-45 trainer for the US Navy with Boeing as prime contractor. In addition, BAE Systems – together with Boeing – provides on-going technical support to the Harrier AV-8B aircraft in service with the US Marines.
  - *Combat Systems* - Electronic identification systems on aircraft and helicopters including the E2-C Hawkeye, EA-6B Prowler, F/A-18 Hornet, P-3C Orion, S-3 Viking and SH-60 Seahawk.
  - *Electronic Warfare Systems* - BAE Systems Integrated Defense Solutions produces the AN/ALE-47 Countermeasures Dispenser System that is used on

[36] Alexander Nicoll, 'GEC in $1.4bn takeover of US defence group Tracor', *Financial Times*, 22 April 2000, p. 1; John D. Morrocco, 'BAE Systems boosting North American clout', *Aviation Week & Space Technology*, 1 May 2000, p. 31; Andrew Edgecliffe-Johnson and Christopher Parkes, 'BAe in $1.6bn US purchase', *Financial Times*, 14 July 2000.

[37] Kevin Done, 'BAe set to top the defence league', *Financial Times*, 15/16 July 2000, p. 14.

almost all US military combat and transport aircraft and helicopters. BAE Systems also supplies the AN/ALQ-178 RF countermeasures system on the F/A-18 Hornet, DECM system on the AV-8B and countermeasures systems on the B1-B.

- *Avionics and Navigation* – avionic displays for the F-16 and F-22 are supplied by BAE Systems' UK-based Avionics Division.
- *Aeronautics Products* - fuel and vehicle management systems for aircraft and helicopters such as the KC-135 and UH-60 Blackhawk.
- *Systems Technical Support* - command, control and communications engineering including that for Naval Sea Systems Command, Trident and the Air Force Mission Support System. Range systems and support for the US Army.
- *Simulation and training* – including for the Patriot missile system.

15.5 Potential future programmes

BAE Systems has an interest in a number of potential future US programmes and these are set out in Table 15.5 (pages 107-108). Significant programmes include:

- *Joint Strike Fighter* – BAE Systems is a member of both the Boeing and Lockheed Martin teams and – through the acquisition of Lockheed Martin's Control Systems and Aerospace Electronics Systems businesses - the company further increased its interest in the programme.
- *C-130X Avionics Modernisation Program* – BAE Systems is leading one of the four teams bidding for the AMP program.
- *F-22 Raptor* – BAE Systems is supplying avionics displays and flight controls, electronic warfare systems and vehicle management system modules.
- *Global Hawk* – BAE Systems is supplying mission planning software.
- *RAH-66 Comanche* – BAE Systems is supplying the fly-by-wire control system.
- *V-22 Osprey* – BAE Systems is supplying the primary/automatic control system as well as countermeasure systems.
- *Tracer/FSCS* – BAE Systems is a member of both of the teams competing for the US-UK Tracer/Future Scout Cavalry System programme.

15.6 Financial performance

BAE Systems has a strong market position in defence, a strong balance sheet and cash flows and record order books. However, whilst there is agreement amongst most financial analysts that its medium-term financial prospects appear strong, 2001-2003 are likely to prove difficult as the company transitions to full production of the EF-2000 Eurofighter.

Key financial data

The following figures provide a summary financial profile of the company at year end 2000:

- Sales of £9.65 billion ($13.5 billion).
- Earnings before interest, taxes, depreciation and amortization (EBITA) were £704 million ($985.6 Million) or 7.3% of sales.
- The current order book was £41 billion ($57.4 billion), up from £37 billion ($51.8 billion) at the 1999 year end.

- Long-term debt was £1.06 billion ($1.5 billion) and the long-term debt to equity ratio was 0.15.

Share price weakens in response to short-term difficulties

Figure 15.6 (page XX) illustrates the stock market performance of BAE Systems over the last five years. From 1997 until late 2000, British Aerospace/BAE Systems consistently outperformed the FTSE 100 on the back of a consistent earnings and profit record and stock market expectations regarding potential industry consolidation.[38] However, the announcement of the British Aerospace-Marconi Electronic Systems merger caused a sharp fall in the company's share price. More significantly, on January 10th 2001, shares in BAE Systems fell by nearly 25% in response to an announcement from the company of one-off restructuring charges of £525 million ($735 million) and a warning of slower profits growth for the next two years. The causes of these problems are as follows[39]:

- BAE Systems is experiencing a gap between the phasing out of some of its biggest military programmes – not least the Tornado combat aircraft – and the move to full production of the EF-2000 Eurofighter. Eurofighter output does not build up significantly until 2002 and beyond.
- BAE Systems has been overoptimistic about the level of potential export orders for its Hawk aircraft and engineering and maintenance contracts from the UK Ministry of Defence.
- Returns from the Al Yamamah contract with Saudi Arabia are falling.
- Delays and cost overruns on the Nimrod maritime patrol aircraft programme.
- BAE Systems hopes that the decline in profits from its Programmes business will be offset in part by earnings from Airbus – the European civil aircraft manufacturer in which it holds a 20% stake – and profitable growth from Avionics and BAE Systems North America.

Prospects

Despite its recent problems, BAE Systems has a strong market position in defence, a strong balance sheet and cash flows and record order books. There is agreement amongst most financial analysts that its medium-term financial prospects appear strong. The key issues for BAE Systems over the next five years will be its ability to bridge the gap before full production of the EF2000 Eurofighter and the capacity of the company's management to effectively integrate Marconi Electronic Systems and its recent US acquisitions. At the same time, BAE Systems faces a danger that it may be excluded from certain European markets by the dominance of EADS.

[38] The FTSE 100 (Financial Times/Stock Exchange 100) is a composite of the 100 largest companies listed on the London Stock Exchange.
[39] Kevin Done 'Why BAE is between landing and take-off' *Financial Times*, 11 January 2001, p.26.

Figure 15.6: BAE Systems Five Year Share Profile Against the FTSE 100

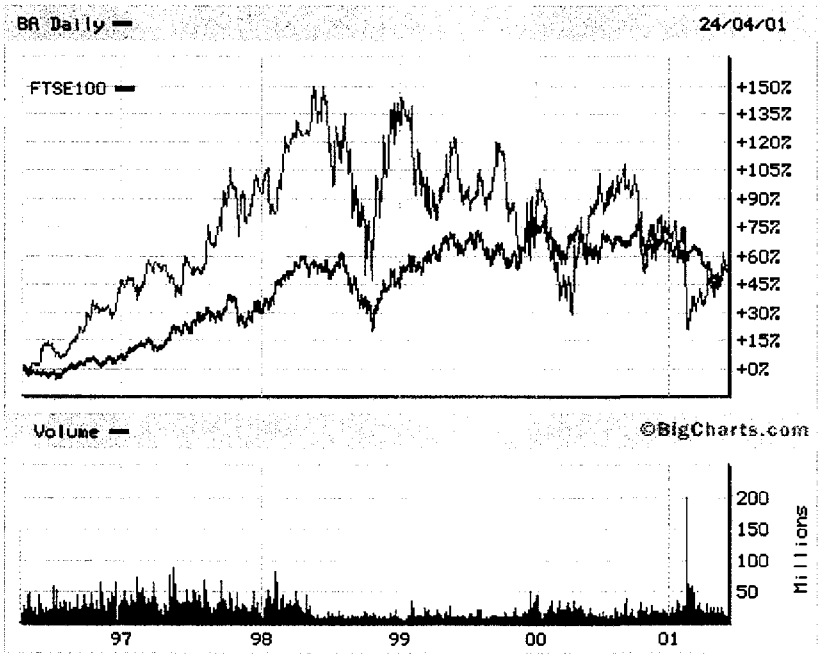


Table 15.3: BAE Systems - Acquisitions and divestments involving US companies

Year	Transaction	European company involved	Sector	Comment
1996	Acquisition of Hazeltine	GEC Marconi Electronic Systems	El	$110m acquisition of IFF manufacturer
Feb 1997	Acquisition of Reflectone	British Aerospace	El	Acquisition for $39mof the 47% BAe did not already own.
1998	Acquisition of Tracor	GEC Marconi Electronic Systems	El	$1.4 billion deal represented largest foreign acquisition of a US defence company
Nov 1999	Acquisition of GEC Marconi Electronic Systems	British Aerospace	El; Mi; Sh	Marconi North America (including Tracor) became part of the renamed BAE Systems
Feb 2000	Acquisition of Femtometrics, Inc.	BAE Systems	Oth	A technology company specializing in chemical agent detection – terms of the deal were not disclosed.
May 2000	Acquisition of Lockheed Martin Control Systems	BAE Systems	El	$0.51bn
July 2000	Acquisition of Lockheed Martin aerospace electronics business	BAE Systems	El	$1.67bn becomes largest ever foreign acquisition of a US defence company
2001	Divestment of BAE Systems Flight Simulation and Training		El	Acquired by CAE (Canada)

Table 15.4: BAE Systems - Current US defence programmes (orders and deliveries 1998-2000)

Programme	US customer	Programme classification	BAE Systems contribution	Comments
Harrier AV-8B	Marine Corps	Ac;El;Oth	Co-development Digital flap control AN/ALQ-164 defensive electronic countermeasure (DECM) system	BAE Systems (UK) with Boeing as prime contractor BAE Systems Controls BAE Systems, Information & Electronic Warfare Systems, Countermeasures
T-45 Goshawk	Navy	Ac	Co-development	BAE Systems (UK) with Boeing as prime contractor
E-2C Hawkeye	Navy	Ac;El	OL-76/AP IFF detector processor OL-483/AP airborne interrogator system	BAE Systems, CNI Div. BAE Systems, Advanced Systems Div.
EA-6B Prowler	Navy	Ac;El	AN/ALQ-99 transmitters AN/APX-72 IFF System Improved Capability III	BAE Systems, Aerospace Electronics BAE Systems, CNI Div. BAE Systems, Information & Electronic Warfare Systems
F/A-18 Hornet	Navy Marine Corps Air Force	Ac;El	Flight control electronics AN/ALQ-178 RF countermeasures AN/APX-111 CIT (Combined Interrogator Transponder) Advanced Tactical Airborne Reconnaissance System (ATARS) AN/ALE-47 Countermeasures system	BAE Systems Controls BAE Systems, Information & Electronic Warfare Systems, Threat Warning & Defensive Systems BAE Systems, Advanced Systems BAE Systems, Reconnaissance & Surveillance Systems BAE Systems, Integrated Defense Solutions
HH-60H	Navy	Hel;El	AN/ALE-47 Countermeasures system	BAE Systems, Integrated Defense Solutions

Table 15.4: BAE Systems - Current US defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	US customer	Programme classification	BAE Systems contribution	Comments
Mk 41 Vertical Launching System	Navy	Mi;Oth	Support services	BAE Systems Applied Technologies, Systems development & Integration
P-3C Orion	Navy	Ai;El;Oth	AN/APX-76A IFF interrogator AN/TPX-54 IFF AN/ARR-78(V) AN/ALE-47 Countermeasures system	BAE Systems, CNI Div. BAE Systems, Integrated Defense Solutions
S-3 Viking	Navy	Ai;El	AN/APX-76 IFF interrogator AN/ARR-78(V)2	BAE Systems, CNI Div.
S-3B Viking	Navy	Ai;El	Flight control system	BAE Systems Controls
SH-60 Seahawk	Navy	Hel;El;Oth	AN/APX-76A(V) IFF transponder AN/ALE-47 Countermeasures system	BAE Systems, CNI Div. BAE Systems, Integrated Defense Solutions
Tactical Tomahawk	Navy	Mi	Weapon Control System strike coordination software	BAE Systems Mission Solutions, Imagery & Information Systems
Strategic Systems Programmes	Navy	Mi;Oth	System integration support for Trident C4 & Trident D5	BAE Systems Applied Technologies
Naval Sea Systems Command	Navy	Oth	System engineering, system integration, software development & technical assistance for standard missile system integration & weapon direction system design agent efforts	BAE Systems Applied Technologies
AN/ARR-78(V)1/2	Navy	El	Advanced Sonobuoy Communication Link	BAE Systems, Advanced Systems Div.

Table 15.4: BAE Systems - Current US defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	US customer	Programme classification	BAE Systems contribution	Comments
AN/UPX-37	Navy	EI	Digital IFF Interrogator	BAE Systems, Advanced Systems Div.
DIWSA	Navy	EI	Digital Imagery Workstation Suites Afloat	BAE Systems Mission Solutions, Imagery & Information Systems
Integrated Defensive Electronic Countermeasure (IDECM)	Navy	EI	AN/ALE-55 Fiber Optic Towed Decoys.	BAE Systems, Information & Electronic Warfare Systems, Countermeasures
Intelligence and Information Technology Management (IITM) program.	Navy	EI	Software and systems; network and communications; computer hardware and maintenance; as well as other architectural, engineering, administrative, security, and management services	BAE Systems, Applied Technologies
USMC Ground Weapons	Marine Corps	Oth	Engineering & Technical Services	BAE Systems, Applied Technologies
A-10 Thunderbolt II	Air Force	EI	Upgrade of LASTE computer	BAE Systems Controls
B-52	Air Force	EI	Integration of Air Force Mission Support System (AFMSS) AN/AAQ-23 infrared sensor	BAE Systems, Information & Electronic Warfare Systems, Information Dominance Systems BAE Systems, Reconnaissance & Surveillance Systems

Table 15.4: BAE Systems - Current US defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	US customer	Programme classification	BAE Systems contribution	Comments
B-1B	Air Force	El;Oth	Integration of Air Force Mission Support System (AFMSS) Intermediate Automatic Test Equipment (IATE) AN/ALQ-178 RF countermeasures	BAE Systems, Information & Electronic Warfare Systems, Information Dominance Systems BAE Systems, Information & Electronic Warfare Systems, Threat Warning & Defensive Systems
B-2	Air Force	El	Flight control electronics	BAE Systems Controls
C-5	Air Force	El	AN/ALE-47 Countermeasures system	BAE Systems, Integrated Defense Solutions
C-17 Globemaster III	Air Force	El	Central processing unit (CPU) Core Integrated processor, electronic flight control system Systems controllers & cockpit indicators AN/ALE-47 Countermeasures system	BAE Systems Information & Electronic Warfare Systems, Avionics Div. BAE Systems Controls BAE Systems Controls BAE Systems Integrated Defense Solutions
C-130	Air Force Marine Corp	El	AN/APX-76C air-to-air radar AN/ALE-47 Countermeasures system	BAE Systems, CNI Div. BAE Systems Integrated Defense Solutions

Table 15.4: BAE Systems - Current US defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	US customer	Programme classification	BAE Systems contribution	Comments
C-130J	Air Force Marine Corp	EI	Advanced cockpit displays AN/ALQ-157 infrared jammer AN/ALR-57 radar warning receiver AN/ALE-47 Countermeasures system	BAE Systems Information & Electronic Warfare Systems, Avionics Div. BAE Systems Information & Electronic Warfare Systems, Countermeasures BAE Systems Information & Electronic Warfare Systems, Threat Warning & Defensive Systems BAE Systems Integrated Defense Solutions
C-141	Air Force	EI	AN/ALE-47 Countermeasures system	BAE Systems Integrated Defense Solutions
E-3 AWACS	Air Force	EI	Colour monitors	BAE Systems, Advanced Systems Div.
F-15 Eagle	Air Force	EI	AN/APX-76 interrogator Flight control computer AN/ALQ-178 RF countermeasures AN/AVD-5 electro-optical long-range oblique photography system (EO-LOROPS)	BAE Systems, CNI Div. BAE Systems Controls BAE Systems, Information & Electronic Warfare Systems, Threat Warning & Defensive Systems BAE Systems, Reconnaissance & Surveillance Systems
F-16 Fighting Falcon	Air Force	EI	Avionics displays & flight controls Avionics Intermediate Shop (AIS) AN/ALR-56M(V) advanced radar warning receiver AN/APX-113 IFF AN/ALE-47 Countermeasures systems	BAE Systems Avionics (UK) BAE Systems Controls BAE Systems, Information & Electronic Warfare Systems, Threat Warning & Defensive Systems BAE Systems, Advanced Systems Div. BAE Systems Integrated Defense Solutions

Table 15.4: BAE Systems - Current US defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	US customer	Programme classification	BAE Systems contribution	Comments
EF-111 Raven	Air Force	El	AN/APX-64 IFF transponder	BAE Systems, CNI Div.
F-111 Aardvark	Air Force	El	AN/APX-64 & AN/APX-76 IFF transponder	BAE Systems, CNI Div.
KC-135 Stratotanker	Air Force	El	Fuel Savings Advisory System (FSAS)	BAE Systems Controls
U-2	Air Force	El	Autopilot/Air Data System	BAE Systems Controls
Air Force Mission Support System (AFMSS)	Air Force	Oth		BAE Systems, Information & Electronic Warfare Systems, Information Dominance Systems
MIDS	US Air Force France Germany Italy Spain	El	Data link between air, ground, and naval forces, for installation aboard the F/A-18, France's Rafale, & Eurofighter 2000.	BAE Systems, Electronic Systems a part of MIDSCO joint venture with Thales (FR), Siemens (GER), Italtel (IT) & Indra Sistemas (SP)
AH-65D Apache	Army	El	AN/ALQ-212 Advanced Threat Infrared Countermeasures (ATIRCM)	BAE Systems, Information & Electronic Warfare Systems, Countermeasures
Javelin	Army	El	Focal plane array detector subassembly (second source)	BAE Systems, Information & Electronic Warfare Systems, Infrared & Imaging Systems
Longbow Hellfire	Army	El	Millimeter-wave transceivers	BAE Systems, Information & Electronic Warfare Systems, Microwave, Space & Mission Electronics
MH-47D	Army	El	AN/ALE-47 countermeasures system	BAE Systems, Integrated Defense Solutions
MH-60L/K	Army	El	AN/ALE-47 countermeasures system	BAE Systems, Integrated Defense Solutions

Table 15.4: BAE Systems - Current US defence programmes (orders and deliveries 1998-2000) (cont.)

Programme	US customer	Programme classification	BAE Systems contribution	Comments
Patriot	Army	El	AN/TRX-46(V)7 IFF interrogator Conduct of Fire Trainer Operator Tactics Trainer	BAE Systems, CNI Div. BAE Systems, Information & Electronic Warfare Systems, Information Dominance Systems
SINCGARS	Army	Oth	Automatic test equipment	BAE Systems Mission Solutions, Test & Space Systems
UH-60 Black Hawk	Army	El	Auxiliary fuel management system	BAE Systems Controls
US Army Electronic Proving Ground	Army	Oth	Support services	BAE Systems Technical Services
US Army Garrison Hawaii, Logistical Support & Services		Oth	Support services	BAE Systems Technical Services
AN/ALQ-144A(V)	Army	El	IRCM systems for various Army helicopters	BAE Systems, Information & Electronic Warfare Systems, Countermeasures

Table 15.5: BAE Systems - Potential future programmes

Programme	US customer	Programme classification	BAE Systems contribution	Comments
Joint Strike Fighter	Air Force Marines Navy	Ac;El	Co-development Electronic warfare suite Flight control processor, vehicle management system Electronic warfare system, ICP subsystem integrator Vehicle management computer	BAE Systems (UK) BAE Systems, Reconnaissance & Surveillance Systems BAE Systems Control BAE Systems Information & Electronic Warfare Systems, Avionics Div. BAE Systems Control
C-130X Avionics Modernization Program	Air Force	Ac;El	Avionics modernisation	Teamed with Honeywell, Logicon, Snow Aviation & BAE Systems (UK)
F-22 Raptor	Air Force	Ac;El	Avionics displays & flight controls AN/ALR-94 electronic warfare suite Display suite Vehicle management system modules	BAE Systems Avionics (UK) BAE Systems Information & Electronic Warfare Systems BAE Systems Controls
RQ-4A Global Hawk (Tier II+)	Air Force	Ac;El	Mission planning software	BAE Systems Mission Solutions, Imagery & Information Systems
RAH-66 Comanche	Army	Hel;El	Fly-by-way flight controls	BAE Systems Controls
V-22 Osprey	Navy Marine Corp	Ai;El	Primary/automatic flight control system AN/ALE-47 Countermeasures system	BAE Systems Controls BAE Systems, Integrated Defense Solutions

Table 15.5: BAE Systems - Potential future programmes (cont.)

Programme	US customer	Programme classification	BAE Systems contribution	Comments
TRACER/FSCS	Army	MV	Co-development	BAE Systems is a member of both the competing teams (Lancer Consortium & SIKA International)
XM777 Lightweight Towed 155m Howitzer	Marine Corps Army	A	Prime contractor	BAE Systems Royal Ordnance Defence (UK) with 70% of production effort in US through United Defense & Hydromill Inc.

16. Rolls-Royce

UK company Rolls-Royce is a leading manufacturer of aero engines and industrial derivatives for commercial aircraft, regional aircraft and military aircraft and helicopters. The company is the 18th largest defence contractor in the world by sales[40] and the second largest aero engine manufacturer after General Electric. The company plays a significant role in the US defence market through its Allison Aero Engine subsidiary (acquired in 1995) and direct sales by Rolls-Royce Military Aero Engines (UK) to US programmes such as the T-45 Goshawk and the Harrier AV-8B. In 1999, defence accounted for sales of £1138m ($1593.2m) or 24% of total sales.

16.1 Corporate organisation

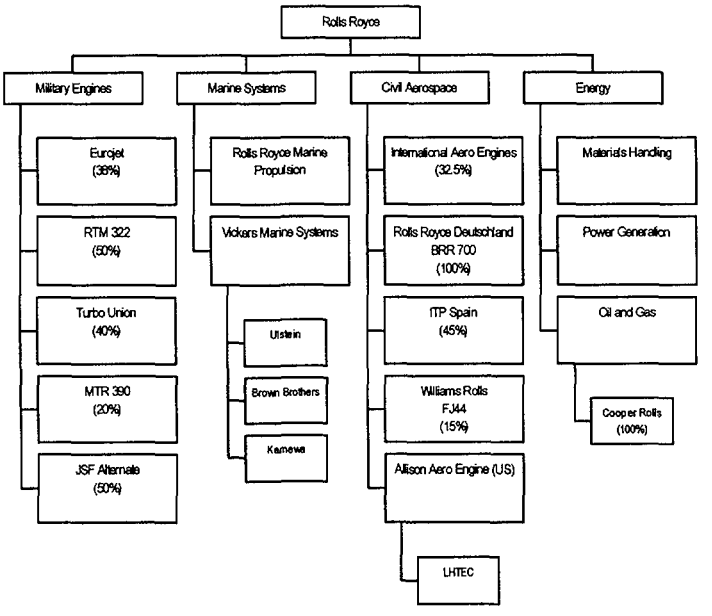
The corporate organisation of Rolls-Royce is set out in Figure 16.1 below (page 110). The key organisational features of particular relevance to its participation in the US defence market are as follows:

- *Allison Engine Co.* is Rolls-Royce's principal US operation. A wholly-owned subsidiary of Rolls-Royce, Allison Engine Co. designs, manufactures, markets and supports gas turbine engines for aerospace, industrial and marine markets.
- *Allison Advanced Development Co.* (AADC) is an operation of Allison Engine Co. established to meet US government requirements for a company under foreign ownership, control or influence. AADC performs secret US government development programmes and has an independent proxy board, its own management and additional US Department of Defense security procedures. In 2000, the US DoD announced that certain security restrictions pertaining to Allison would be amended in recognition of the company's exemplary security record under Rolls-Royce. The proxy company that operated within Allison Engine Co. was eliminated and all Allison's activities now operate under a single Special Security Agreement.[41]
- *Rolls-Royce Military Aero Engines Ltd.* based in Bristol (UK) is responsible for direct sales to the US of engines for the T-45 and AV-8B programmes and is participating in the Joint Strike Fighter Alternate Engine Program.
- *Joint Strike Fighter Alternate Engine Program* - Rolls-Royce has a 40% share in the JSF alternate engine programme comprised General Electric (60%); Allison Advanced Development Co. (25%), and Rolls-Royce Military Aero Engines Ltd. (UK) (15%).
- *Rolls-Royce Marine Systems* is responsible for its marine gas turbine business for defence and civil applications.

[40] Source: Defense News 'Top 100' survey.

[41] This eliminated the strange situation where security restrictions meant that engineers in one part of Allison were unable to talk with colleagues in another unit on the same site without receiving authorisation from the Department of Defense.

Figure 16.1: Rolls Royce Company Organisation



16.2 Corporate strategy

Rolls-Royce's strategy is focused on establishing leading positions in the aerospace, marine and energy markets for gas turbine engines. The company has sought to do this as follows:

- *To enhance its position in marine propulsion segment* - In November 1999, Rolls-Royce acquired Vickers PLC in a £576 million ($806 million) transaction. The objective of the deal was to acquire Vickers' marine engine division and in particular its marine waterjet technology which Rolls-Royce sees as an important element in the growth of its marine business. Significantly, Rolls-Royce announced that it would be looking to sell Vickers' land-based defence business and has been in talks with – amongst others – Carlyle Group/General Dynamics.
- *To strengthen its position in the aerospace segment* - In December 1999. Rolls-Royce acquired the 50% it didn't already own of joint venture BMW Rolls-Royce GmbH (now Rolls-Royce Deutschland) from partner BMW AG. In return BMW received a 10% overall stake in Rolls-Royce plc.
- *Broaden its range of products and services* within the gas turbine sector through expanded repair and overhaul activities and expanding aftermarket activity.

16.3 Acquisitions and divestment involving US companies

Rolls-Royce has executed two defence-related acquisitions in the United States:

- *Allison Engine Co* – acquired by Rolls-Royce in 1995 for $525m. At the time, the transaction was seen as a ground-breaking development for European participation in the US defence market not least because of Allison Engine Co.'s position on a range of sensitive US military programmes.

- *National Airmotive Corp.* – acquired in 1999 for $73m. The acquisition of this engine repair and overhaul business can be seen as part of an effort at vertical integration by Rolls-Royce. In 1998, National Airmotive had won its largest ever contract from the US Navy worth a potential $189m for the repair of T56 engines manufactured by Allison. Thus, it built on Rolls-Royce's engine services business (an area in which it had lagged rivals GE and Pratt & Whitney) and complemented its 1995 acquisition of Allison.

16.4 Current US defence programmes

Through its acquisition of Allison Aero Engine, as well as direct sales, Rolls-Royce has established a strong position on a range of US defence programmes. Rolls-Royce's participation in those programmes is set out in Table 16.4 (pages 115-116):

- *Aircraft* – Allison engines power the P-3 Orion. Allison engines also power the Lockheed Martin C-130 and the C-130H and the new generation engine from Allison – the AE 1200 turboprop – is used as the engine for the C-130J transport aircraft. Through direct sales, Rolls-Royce Military Aero Engines supplies engines for the AV-8B and the US Navy T-45.
- *Helicopters* – Allison has a strong market share in helicopter engines and its AE250 series of engines power the Bell TH-67 and OH-58D. Allison's T-406 engine powers the Boeing-Bell V-22 Osprey.
- *Naval systems* – Allison is providing Redundant Independent Mechanical Start-Up Systems for the DDG-51.
- *Armoured vehicles* – Allison provides auxiliary power units for the Army's M1A2.

16.5 Potential future programmes

Rolls-Royce has an interest in a number of potential future US programmes and these are set out in Table 16.5 (page 117). Significant programmes include:

- Joint Strike Fighter – Rolls-Royce has a 40% share (GE 60%) in the Joint Strike Fighter Alternate Engine Program with General Electric & is providing the STOVL lift system for Pratt & Whitney.
- WR-21 – Rolls-Royce has co-developed the WR-21 marine turbine engine with Northrop Grumman (US) & DCN (France) and it is the goal of the US Navy and the contractor team to introduce the WR-21 into existing US surface combatant designs as well as future applications.
- Global Hawk – Allison's AE3007H engine powers the Global Hawk UAV.
- C-5 Upgrade - Allison Engine Co. is bidding the Rolls-Royce Trent engine as an upgrade for the C-5 transport aircraft.

16.6 Financial performance

For year end 2000, Rolls-Royce was able to announce a record order book of $18.5 billion reflecting a strengthening position in its defence/aerospace, marine and energy businesses. However, the company's shares have continued to under perform the stock market, reflecting investor concerns about poor profitability and cash flow.

Key financial data

The following figures provide a summary financial profile of the company at year end 2000:

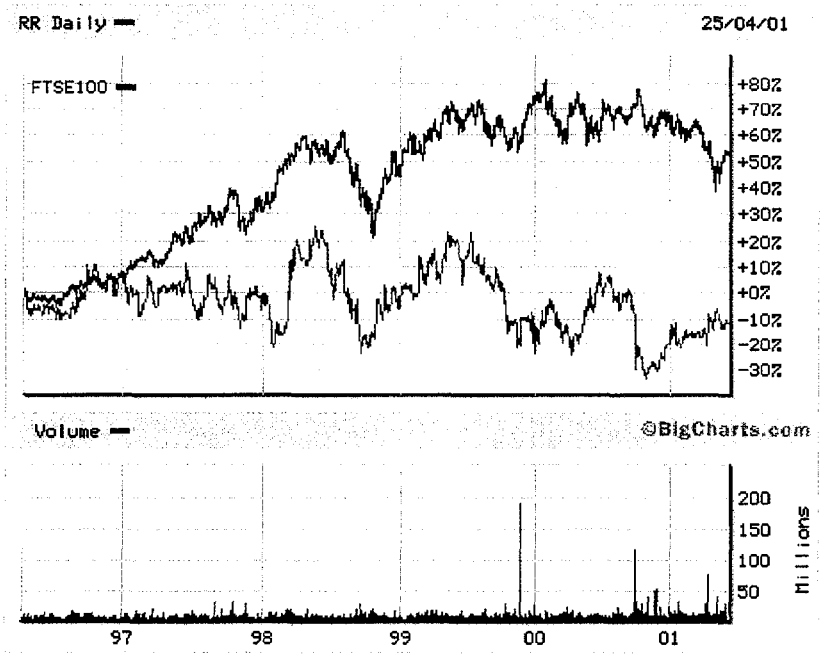
- Sales of $5.86 billion (approximately $8.2 billion), up 27% over the previous year.

- Earnings before interest, taxes, depreciation and amortization (EBITA) were £318 million ($445 million) or 5.4% of sales.
- The current order book was £13.2 billion ($18.5 billion).
- Long-term debt was £1.06 billion ($1.5 billion) and the long-term debt to equity ratio was 0.52.

Battling against investor sentiment

A period of steady but slow growth in revenue during the early and mid 1990s were followed by faster growth in revenue from 1995, largely as a result of the success of Rolls' civilian programmes. At the same time, problems experienced by its main competitors, General Electric and Pratt & Whitney, in launching new engines have allowed Rolls to win a larger share of the civilian aerospace market. However, historical financial returns have been poor and this is reflected in investor sentiment towards the company's shares and its management. Figure 16.6 shows the stock market performance of Rolls-Royce over the last five years. Shares in Rolls-Royce have consistently under performed the FTSE-100 and – as has already been noted – investor pressures have driven management to pay greater attention to cash flow and profitability. Under pressure from investors to demonstrate improved performance, Rolls-Royce has placed considerable focus on efficiency and reducing costs. Major supplier and cost initiatives were started in 2000 and the number of suppliers is being reduced. At the same time, an increasing share of work is being outsourced in a bid to increase sales per employee. Restructuring and rationalisation has led to announcements of job losses in the United Kingdom. Restructuring proposals announced in 2000 could lead to 2,000 redundancies per annum for the next three years, reducing the workforce from the current 40,000 to below 35,000[42].

Figure 16.6: Rolls Royce Five Year Share Profile Against the FTSE 100



[42] *Rolls-Royce*, report by Credit Suisse First Boston, 5 March 2001.

Prospects

Rolls-Royce has built up a strong market position in both commercial and defence aero-engines and internal restructuring combined with a forecast growth in spares and support service business is likely to greatly improve its profitability. Nevertheless, the company continues to battle with adverse investor sentiment. Historical financial returns have been poor and management will continue to face pressure from share holders to improve performance.

Table 16.3: Rolls-Royce - Acquisitions and divestment involving US companies

Year	Transaction	US company involved	Sector	Comment
March 1995	Acquisition	Allison Engine Co.	Eng	Deal worth $525m
October 1999	Acquisition	National Airmotive Corp.	Eng.	$73m acquisition of engine repair & overhaul business with $189m contract for repair of T56 engines.

Table 16.4: Rolls-Royce - Current US defence programmes

Programme	US customer	Programme classification	Prime contractor	Comments
AV-8B	Marine Corps	Ai/Eng	Boeing	F402-RR-408 engine supplied by Rolls-Royce Military Aero Engines Ltd. (UK)
T-45	Navy	Ai/Eng	Boeing	F405-RR-401 Adour turbofan engine supplied by Rolls-Royce Turbomeca Ltd. (a joint venture of Rolls-Royce and France's Turbomeca)
V-22 Osprey	Marine Corps Army	Hel/Eng	Boeing-Bell	T406-AD-400 turboshaft engines power V-22 & derivatives (MV-22 & CV-22)
C-130J	Air Force Marine Corps	Ai/Eng	Lockheed Martin	AE2100D3 turboprop engines. Major suppliers are: Dowty Aerospace Propellers (UK) Lucas Aerospace Engine Control Systems (a UK-based subsidiary of TRW)
TH-67	Army	Hel/Eng	Bell Helicopter	AE250-C20JN
OH-58D	Army	Hel/Eng	Bell Helicopter	AE250-C30R/3
DDG-51	Navy	Sh/Oth	Litton Industries Ingalls	Allison Engine providing Redundant Independent Mechanical Start Systems (RIMSS)
M1A2	Army	MV/Oth	General Dynamics	Allison Engine provides auxiliary power units (APUs)
C-130	Air Force Marine Corps	Ai/Eng	Lockheed Martin	T56/501D engines
P-3	Navy	Ai/Eng	Lockheed Martin	T56/501D engines
P-3B	Navy	Ai/Eng	Lockheed Martin	T56-A-14 engines
P-3C	Navy	Ai/Eng	Lockheed Martin	T56-A-14 engines

Table 16.4: Rolls-Royce - Current US defence programmes (cont.)

Programme	US customer	Programme classification	Prime contractor	Comments
E-2C	Navy	Ai/Eng	Northrop Grumman	Originally fitted with two Allison T56-A-425 turboprop engines E-2C Group I variants feature T56A-427 engines
C-130H	Air Force Marine Corps	Ai/Eng	Lockheed Martin	T56-A-15

Table 16.5: Rolls-Royce - Potential future programmes

Programme	US customer	Programme classification	Prime contractor	Comments
Joint Strike Fighter	Air Force Navy Marine Corps	Ai/Eng	Boeing Lockheed Martin	Rolls-Royce has a 40% share (GE 60%) in the Joint Strike Fighter Alternate Engine Program with General Electric & is providing the STOVL lift system for Pratt & Whitney.
WR-21	Navy	Sh/Eng	Co-development with Northrop Grumman (US)	DCN (France) is a marketing partner
Global Hawk	Air Force	Ai/Eng	Northrop Grumman	AE3007H
C-5 upgrade	Air Force	Ai/Eng	Lockheed Martin	Allison Engine Co. bidding the Rolls-Royce Trent engine

17. The prospects for a transatlantic defence industry

The previous sections of this report have described the transatlantic defence industrial activities of a number of leading US and European defence contractors. We have noted that the last fifty years have seen the evolution of transatlantic defence industrial relationships from predominantly government-led arrangements driven by Cold War concerns about Western European military capabilities towards increasingly industry-led relationships driven by commercial concerns about market access. This section will consider the near and mid-term prospects for the further development of a transatlantic dimension to the defence industry.

17.1 Moves towards a transatlantic dimension to the defence industry will continue

There is little doubt that the gradual move towards a transatlantic dimension to defence industry restructuring will continue and there are a number of reasons to think this will be the case.

- *Government concerns about interoperability and affordability* – we have already noted the pressures towards transatlantic defence industrial relationships emerging from government concerns about military interoperability and the need to reduce the cost of defence equipment. Such pressures are likely to grow in the foreseeable future.
- *Business pressures for closer transatlantic defence industrial relationships* – similarly, we have noted that the companies in the newly consolidated European defence industry and their US counterparts face significant business pressures to expand their international activities. Transatlantic relationships will play a growing part in their strategies.
- *Major procurement programmes are increasingly subject to transatlantic teaming* – equally, our company profiles have shown that many of the major forthcoming procurement programmes in the United States and particularly Europe have an important transatlantic dimension.
- *Recent transatlantic acquisition and joint venture activity represents a watershed for transatlantic defence industrial relationships* – three recent transactions may be argued to represent a watershed in transatlantic defence industrial relationships. First, BAE Systems' acquisitions of Lockheed Martin's Control Systems and Aerospace Electronic Systems businesses has placed a European company in a central position in the US defence industry as a leading supplier to the US Department of Defense and a participant in some of the most sensitive US technology programmes. Second, the Thales Raytheon Systems Co. joint venture has shown that non-UK European companies can also address US government security concerns and that French companies may be able to gain real access to the US Finally, the recent acquisitions in Europe by General Dynamics and United Defense suggest that US companies may be increasingly willing to consider acquisition as a route into the European market.

17.2 Mega-mergers are unlikely in current circumstances

Irrespective of these recent developments, however, there are good reasons to be cautious about the speed at which transatlantic developments will proceed. Past experience suggests that the development of a transatlantic dimension to the defence

industry is likely to be cautious and there are likely to be plenty of political, regulatory and business challenges ahead. Thus, although a number of acquisitions have been completed, full mergers between the leading US and European prime contractors seem highly unlikely in current circumstances.

Such deals would require enormous political commitment from governments on both sides and a step-change in attitudes towards national defence industrial capabilities and national security. Equally important, perhaps, the business risks and costs associated with any transatlantic mega-merger would most likely outweigh the potential commercial benefits. To make business sense any deal would need to provide real cost savings through operational synergies and much more than merely market access and political influence. Many leading Wall Street investment analysts hold a negative view on the matter and this has tended to colour the attitude of defence industry executives. Many analysts believe that acquisitions in Europe would dilute the earnings of US companies because they offer limited scope for cost savings. A survey by the Government Electronics and Information Technology Association starkly captures the dilemma faced by US companies:

> "In simplified form, if a US company wishes to buy a European firm, and to make the deal work, you either have to cut back their capacity and fire foreigners, or cut back your own capacity and fire Americans. And there certainly aren't many incentives for those kinds of business deals".[43]

Equally, it seems rather unrealistic to expect major transatlantic acquisition activity while other, less risky and lower commitment forms of US-European industrial relationships remain at a relatively early stage of development for many companies.[44] Instead, equity relationships amongst the largest companies are more likely to emerge slowly and then only after they have overcome numerous business and political hurdles. This is not to say that transatlantic acquisitions will not continue and perhaps increase in number. Certainly, small and medium-sized transatlantic acquisitions involving leading defence companies may well occur where they make business sense. Thus, we could see more deals such as those announced by BAE Systems in the United States and United Defense in Europe, and there is likely to be further acquisition activity amongst lower-tier suppliers.

17.3 But cooperation will broaden and deepen

Given such issues, it seems likely that cooperation rather than merger will almost certainly remain the principal means by which the leading companies will seek to develop transatlantic relationships. Thus, we are likely to see more programme-specific teaming on new US, European and transatlantic programmes. At the same time, some companies may well identify opportunities in certain business areas to bring their activities together into informal alliances, more formal collaborative agreements or perhaps equity-based joint venture structures. In many respects, this scenario sees the extension of current trends and would seem to be the most practical route to building transatlantic relationships between prime contractors. In time, we may witness an evolution of these relationships and we will quite probably see those companies that have worked together on particular programmes considering the

[43] 'Industry Outlook – GEIA 2000-2009 Ten Year Forecast', Government Electronics and Information Technology Association, Arlington, VA.
[44] Robert P. Grant, op. cit. in note 3.

prospects for strategic alliances, and we may see established alliances evolving towards full mergers. This step-by-step approach represents a pragmatic response to the existing political, regulatory and business challenges and will allow the confidence building between governments and the growth of business experience in managing such relationships that are necessary to build a transatlantic defence industry.

17.4 Non-UK European companies will increasingly seek entry into the US market

At the same time, we are likely to see growing efforts by non-UK European companies to enter the US market. The Thales Raytheon Systems Co. joint venture has shown that closer cooperation between US and French companies are feasible in political and regulatory terms as well as desirable from a business perspective. Further developments are highly likely in the near to mid-term not least because entry into the US market is seen as a core element of the strategies of both EADS and Thales.

- *The European Aeronautic, Defence and Space Co. (EADS)* has expressed its intention to develop a transatlantic dimension to its strategy. The company entered the competition to acquire Lockheed Martin's aerospace electronics business teamed with the US defence electronics company L-3 Communications. EADS has signed an MoU with Northrop Grumman under which the two companies are exploring opportunities in ground surveillance and a number of other areas of defence electronics, such as aerial targets and decoys, airborne electronic attack and fire control radar. The first product of this relationship was an agreement to offer a 'European version' of a weather and navigation radar, developed by Northrop Grumman, for the Airbus A400M military transport aircraft.
- *Thales* – the French company (formerly Thomson-CSF) is also seeking to expand its US presence. The company is pursuing what it calls a "multi-domestic" strategy and – through acquisitions and minority equity stakes – it has established positions in the UK, Australia and Brazil. Despite its long-standing ties with Raytheon, Thomson-CSF had always been rebuffed in its efforts to penetrate the US market due to what are perceived as the Pentagon's long-standing suspicion of French intentions. The company's acquisition in 2000 of the UK defence electronics company Racal may alter Thales' position in the United States. One of Racal's most attractive features to the French company was its established position in the US defence market, where it ranked as a leading supplier of radio systems and data recorders to the US armed forces. The acquisition allows Thales to absorb Racal's proxy structure in the United States and – combined with the fact that Thomson was granted a Secret level Special Security Agreement in 1999 for its Texas-based Training and Simulation business – the French company now has a security structure under which it can build a larger US presence. Indeed, Thales has already shown its intent to establish closer ties with US companies by winning two major contracts from Lockheed Martin. The first is to supply electronic warfare equipment for Turkish F-16 fighter aircraft and the second is to supply radio and communications systems for F-16s being sold to the United Arab Emirates. Thales hopes that such contracts will open the door for participation

in the JSF programme, most probably through its Dutch or UK subsidiaries Signaal and Racal.[45]

18. Conclusions

This report has had two objectives. First, the report has sought to describe and analyse the participation of ten leading US defence contractors in the European defence market. Second, it has sought to describe and analyse the organisation and corporate strategy of two European companies (BAE Systems and Rolls-Royce) and to consider their participation in the US defence market. In support of these objectives, the report has also charted the evolution of transatlantic defence industrial relationships over the last fifty years and has considered the near and mid-term prospects for further transatlantic defence industrial developments.

Key findings

A number of key points have emerged from our study and it is worth re-iterating them here:

- The US defence companies that we have examined have differing exposure to the European market as a consequence of the types of systems they produce, their corporate strategies and the extent of European capabilities in those fields. The ten companies can be categorised into four types according to the extent of their participation in European programmes and the extent of their European "footprint" of strategic alliances, joint ventures and wholly-owned subsidiaries.
- There is a growing recognition amongst US companies that they need to do more than offer offsets if they are to secure European contracts in the future. US companies that are seeking to expand their position on European companies are increasingly pursuing strategies that extend beyond FMS to teaming arrangements and consortia with European companies and is supported by a sizeable footprint of European strategic alliances, joint ventures and wholly-owned subsidiaries. In this way, they are seeking to meet increasing European demands for greater technology transfer and industrial participation in major programmes.
- An analysis of the strategies of the US companies suggests an emerging pattern of alliances between leading US and European companies. *Boeing-BAE Systems* have a number of formal and informal alliances across a range of activities. The creation of the *Thales Raytheon Systems Co* joint venture represents the further extension of established relationships between the two companies. *Northrop Grumman and EADS* have entered into alliances in a number of business areas. Equally, *Lockheed Martin and EADS* have long discussed collaborative relationships on mission aircraft.
- What is clear is that the companies in the newly consolidated European defence industry and their US counterparts face significant business pressures

[45] Jean-Pierre Neu, 'Thomson-CSF monte en puissance sur le F16', *Les Echos*, 29/30 Septembre 2000.

to expand their international activities, and transatlantic relationships are likely to be an important dimension of their strategies.

- Non-UK European companies are actively seeking to enter the US defence market through acquisition and joint venture. Historically, European participation in the US defence industry has been dominated by the activities of UK companies. BAE Systems and Rolls-Royce have significant positions as contractors to the US Department of Defense and other companies – such as Smiths Aerospace, Meggitt and Ultra – have established themselves as lower tier suppliers to US prime contractors. However, non-UK European companies are seeking opportunities to enter the US market and amongst these Thales and EADS are likely to be particularly active in the future.